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SECTION 1 - DEFINITION OF TERMS

When in any part of the Contract, the following words or expressions or pronouns used in their stead are used, the intent and meaning shall be interpreted as follows:

ADDENDUM. A supplement to the tender forms as originally issued or printed, covering additions, corrections or changes in the bidding conditions for the advertised work, that may be issued by the Department to prospective bidders prior to the bid closing time.

ADDITIONAL WORK. Additional work means any work or service, which is beyond the scope of the work contemplated by the Contract Documents.

BASE. Granular materials placed immediately below the pavement.

BIDDER. Any individual, firm or corporation submitting a bid for the work contemplated.

BID. An offer submitted in response to an invitation to bid.

BID CLOSING TIME. The time up to which bids will be accepted and beyond which bids will be rejected.

BIDDING PERIOD. A time provided to prospective bidders to assemble and submit their bid. Further defined as the time period between the Invitation to Bid and the Bid Closing Time.

BID SECURITY. A promise to pay to the contracting authority its costs of accepting another bid, up to a specified limit, if the bidder is awarded the bid and fails to enter into the required contract.

BRIDGE. A structure of a span of more than 3 m measured between the abutments and along the centre line of the roadway, and also including multiple spans where the individual spans are more than 3 m. The width of bridges is the distance between the inside faces of curbs (at the top of same) measured at right angles to the centre line of the roadway.

CERTIFICATE OF FINAL ESTIMATE. A report to the Minister by the Engineer that the Contractor has completed the work, and a recommendation that the Final Estimate be paid.

CERTIFICATE OF RECOGNITION. A certificate awarded to firms by the Nova Scotia Construction Safety Association and the Nova Scotia Department of Labour, who have completed the training requirements, fully implemented a loss control program, and successfully participated in the audit process.

CITY. The incorporated City in which the work is being carried out.

COMPETENT BID. The low responsive bid submitted by a responsible Contractor or supplier is deemed to be the lowest competent bid.

CONTRACT. The Agreement covering the performance of the work and the furnishing of materials in the construction of same, which shall include the advertisement, the instructions to Bidders, the Tender, the Province of Nova Scotia Department of Transportation and Public Works Standard Specifications - Highway Construction and Maintenance dated February 1, 1997, Special Provisions, the Specific Agreement, Release from All Liabilities and any Supplemental agreements and all plans pertaining to the work.

CONTRACTOR. The Party of the First Part to the Contract acting directly or through his/her agents or employees and who is primarily liable for the acceptable performance of the work for which he/she has contracted and also for the payment of all legal debts pertaining to the work.

In order to avoid cumbersome and confusing repetition of expressions in this Contract, whenever it is provided that anything is, or is to be, or to be done, if, or as, or when, or where, "contemplated", "required", "directed", "deemed necessary", "permitted", "suspected", "approved", "acceptable", "unacceptable", "suitable", "unsuitable", "satisfactory", "unsatisfactory", or "sufficient", such expressions shall have the same force as if followed by the words "by the Engineer" or "to the Engineer" as the case may be.

COUNTY. The County in which the work is being carried out.

CULVERT. Any structure, not classified as a bridge, which provides an opening under the roadway.

DEPARTMENT, DOT&PW AND DEPARTMENT OF TRANSPORTATION AND PUBLIC WORKS. The Department of Transportation and Public Works of the Province of Nova Scotia.

DEPUTY MINISTER. The Deputy Minister of Transportation and Public Works of the Province of

Nova Scotia.

ENGINEER. The Executive Director District Operations of the Department of Transportation and Public Works acting directly or through an assistant or representatives, duly authorized by the Executive Director District Operations, and only within the scope of the particular duties assigned to them or within the scope of the authority vested in them.

EXTRA WORK. Any work or service, the performance of which is beyond the scope of the contract and for which no quantity and/or price was included in the contract, which is determined by the Engineer to be necessary or desirable to complete the contract.

HIGHWAYS. The whole right-of-way which is reserved for use in constructing the roadway and its appurtenances.

INSPECTOR. The authorized assistant to the Engineer assigned to make inspection of work performed or being performed and materials furnished or being furnished.

IRREVOCABLE STANDBY LETTER OF CREDIT. A written document issued by a Canadian Chartered Bank in a form satisfactory to the Department and used as a security deposit for the contract. The letter of credit shall be unconditional and subject to the uniform customs and practices for documentary credits (1993 Revision) International Chamber of Commerce (Publication No. 500). The bank issuing the letter of credit is obligated to make payment provided the beneficiary (Department) produces a sight draft and a written demand for payment.

LIQUIDATED DAMAGES. The charge assessed against the Contractor by the Department because of failure of the Contractor to complete the contract within the contract time or by the contract completion date.

MATERIALS. Any substances specified for use in the construction of the project and its appurtenances.

MINISTER. The Honourable Minister of Transportation and Public Works of the Province of Nova Scotia.

MUNICIPALITY. The county or district, under the jurisdiction of a Municipal council, in which the work is being carried out.

PLANS. Any Official Plans, Profiles, typical Cross-sections, Working Drawings, Supplemental Drawings, or exact reproductions thereof, approved by the Engineer, which show the location, character, dimensions and details of the work to be done, and which are to be considered as a part of the Contract.

PROJECT. All of the work described in the contract.

PROVINCE. The Province of Nova Scotia.

QUALITY ASSURANCE (QA). All those planned and systematic actions required by the owner or owner's representative, to provide adequate confidence that a product or service will satisfy given requirements for quality. In contractual situations, QA serves to provide confidence in the contractor and/or supplier.

QUALITY CONTROL (QC). The sum total of activities performed by the seller (producer, manufacturer, and/or Contractor) to make sure that a product meets contract specification requirements. Within the context of highway construction this includes materials handling and construction procedures, calibration and maintenance of equipment, production process control, and any sampling, testing, and inspection that is done for these purposes.

ROADBED. That portion of the roadway extending from shoulder line to shoulder line, in other words, the sub-grade and shoulders considered as a unit.

ROADWAY. The portion of the highway included between the outside lines of gutters, or side ditches, including all the appertaining structures, and all slopes, ditches, channels, waterways, etc., necessary for proper drainage and protection.

SCHEDULE OF WORK. The Schedule of Work is defined as a schematic representation of the length of time required to complete individual items of work, and how it relates to other items of work in the contract, all in accordance with the completion date of the contract.

SECURITY DEPOSIT. The Security designated in the Tender to be furnished by the Bidder as a guaranty of good faith to enter into a Contract with the Department and also covering the performance of the work and warranty period if the work contemplated is awarded to said bidder. Said Security shall be retained by the Department as a guaranty of good faith and ability on the part of the Contractor to execute the work in accordance with the terms of the Contract.

SHOULDER. The portion of the roadway contiguous with the travelled way for accommodation of stopped vehicles, for emergency use, and for lateral support of base and surface courses.

SLOPES. The inclined graded areas extending from the shoulders to the natural undisturbed surface of the ground.

SPECIAL PROVISIONS. Additions and/or revisions to the Standard Specifications applicable to an individual contract.

SPECIFICATIONS. The directions, provisions, and requirements described in the Province of Nova Scotia Department of Transportation and Public Works Standard Specifications dated February 1, 1997, supplemented by such Special Provisions as may be necessary, pertaining to the method and manner of performing the work, or to quantities of materials to be furnished under the Contract.

SUBBASE. Granular materials placed immediately below the base and above the subgrade.

SUBGRADE. That portion of the roadbed upon which the subbase (or base in the case subbase gravels are not used) is to be placed.

SUPPLEMENTAL AGREEMENTS. Written agreements executed by the Contractor, and by the Engineer, covering alterations necessary to the project as hereinafter provided.

TENDER. The offer of the Bidder for the work when made out and submitted on the prescribed Tender Form properly signed and guaranteed.

TENDER FORM. All approved forms on which the Department requires formal bids to be prepared and submitted for the work as detailed in the specifications.

TOWN. The incorporated Town in which the work is being carried out.

THE WORK. The furnishing of products, material, labour, equipment and other incidentals necessary or convenient to successful project completion, plus the fulfilment of all duties and obligations required and imposed by the contract.

TRAFFIC CONTROL MANUAL. NS Department of Transportation & Communications (Public Works) Temporary Workplace Traffic Control Manual.

UNFORESEEN WORK. Unforeseen work is work that cannot be covered by any of the various items or combination of items for which there is a bid price. The Engineer may require the Contractor to furnish material and do work not provided for in the tender as may be found necessary or pertinent for the proper completion of the work embraced in the contract.

VALUE ENGINEERING ALTERNATE (VEA). An alternate design or modification(s) to a tendered design where a construction cost saving in excess of $50,000 can be achieved, without compromising the integrity and quality of the project, prepared and submitted as detailed in the specifications.

SECTION 3 - AGREEMENT

THIS AGREEMENT made this.. day of..................................

in the year Two Thousand and...by and between

....

....

herein called the **CONTRACTOR**, the Party of the First Part, and **HER MAJESTY THE QUEEN**, in the right of Her Province of Nova Scotia as represented in this behalf by the **HONOURABLE MINISTER OF TRANSPORTATION and PUBLIC WORKS** of the Province of Nova Scotia herein called the **MINISTER,** the Party of the Second Part.

WITNESSETH, AS FOLLOWS:

1.0 GENERAL COVENANT. The Contractor hereby covenants and agrees with the Minister as herein provided in connection with the following work, namely:

2.0 NO IMPLIED CONTRACT. It is hereby understood and agreed between the Parties hereto that no implied contract of any kind whatsoever, by or on behalf of the Minister, shall arise or be implied from anything contained in this Contract, or from any position or situation of the Parties at any time. It is further agreed that this Contract made by the Minister is and shall be the only Contract, upon which any rights against him are to be founded.

3.0 HOW PARTY OF FIRST PART IS READ. Whenever this Agreement is entered into by more than one Party or Parties of the First Part, the word "Contractor" shall be read "Contractors." All pronouns in the Contract referring to the Contractor shall be read as plural and whenever a Corporation is the Party of the First Part, the said pronouns shall be read accordingly.

4.0 CONSTRUCTION OF CLAUSE AS COVENANTS. Whenever it is stipulated in any part of the Contract that anything shall be done or performed by either of the Parties hereto, it shall have the same effect and be construed as if such Party had entered into a covenant with the other Party to do or perform the same, and as if any such covenant had been expressly made on the part of the Contractor not only on his own behalf but also on behalf of his legal representatives, Successor or Assigns; and as if any such covenant on the part of the Minister and been made on behalf of himself and his Successors in Office.

5.0 PERFORMANCE BY CONTRACTOR. All Contractors shall, at their own cost and expense, furnish and provide all and every kind of labour, superintendence, services, tools, implements, machinery, plant, materials, articles and things whatsoever necessary for the due execution and completion of the work. They shall fully construct, erect and complete the same within the time specified, in the most thorough, workmanlike and substantial manner, in every respect to the satisfaction and approval of the Engineer, and deliver the same to the Minister, all in the manner and upon the terms and conditions of the Contract.

6.0 SECURITY DEPOSIT. The Contractor hereby and herewith deposits with and delivers to the Minister a security for the due fulfilment of their contract in the sum of...................................... dollars ($...........) upon the express understanding that the same will be held and retained by the Minister until the Minister is satisfied that the work has been completed and all provisions of the contract have been met, (ie. Article **26.0 CLAIMS AGAINST CONTRACTOR.** of the General Provisions) and the warranty period has expired, whichever is later, as security for the due and faithful performance, observance and fulfilment by the Contractor of all the covenants, provisions, agreements, conditions and reservations in this contract contained, on the part of the Contractor to be observed, performed and complied with. Provided always and it is understood and agreed that the Contractor assumes the risk and must bear any loss in respect to the security deposited as aforesaid occasioned by the failure or insolvency of the banks on which any certified cheque or letter of credit was drawn or in which any deposit was made in connection with the security aforesaid.

The expiration date for any Irrevocable Standby Letter of Credit used as security for this contract shall be dated no earlier than .... If at any time during the execution of this contract, the Department determines that the completion of any portion of work included in this contract may extend beyond the expiration date, the Contractor shall provide to the Engineer, a new Letter of Credit in the amount of .... with an expiration date dated one year beyond the original expiration date or written proof from the issuer of the original Letter of Credit that it has been extended. If a new Letter of Credit or proof of extension is not provided to the Engineer more than 10 working days prior to the present expiration date, the Department shall automatically draw the full amount of monies stated in the Letter of Credit and hold such monies until a new Letter of Credit or proof of the extension is provided to the Engineer.

If at any time hereafter the Contractor should make default under the said Contract, or if the Minister, in his sole discretion, acting under the powers reserved in the said Contract, shall determine that the said works, or any portion thereof remaining to be done, should be taken out of the hands of the Contractor, and be completed in any other manner whatsoever than by the Contractor, or if the Contractor refuses or neglects to pay any salaries or wages or any accounts for materials due by the said Contractor for work done or materials supplied by any person in connection with the said work, the Minister may, in either case, dispose of said security and of the interest which may have accrued thereon, for the carrying out of the construction and completion of the work of the Contract, or for paying any salaries or wages for work done, or any accounts for materials supplied for the said works that may be left unpaid by the said Contractor.

In the event of any breach, default, or nonperformance being made or suffered by the Contractor in respect of any of the terms of conditions, covenants, provisions, agreements, or restrictions herein contained, which on the part of the Contractor should be observed, performed or complied with, the said money, and interest thereon, so delivered to or deposited with the Minister, or by him received in respect thereof, shall, by the Contractor, be forfeited absolutely to the Minister.

Upon the due and faithful performance, observance and fulfilment by the Contractor of all the terms, provisions, covenants, agreements, conditions and reservations, herein before contained, on the part of the Contractor to be observed, performed and complied with, the Contractor shall be entitled to be repaid or to receive again the money so deposited, together with so much interest upon such money as the Minister may, during his retention or possession of the same, actually receive by reason thereof. However, it is understood that the Minister shall not be under any obligation to cause the said money to placed at interest, or to earn, or to endeavour to earn, interest thereon.

7.0 MINISTER COVENANTS TO PAY. In consideration of the faithful performance by the Contractor of all and singular the covenants, agreements and provisions of the Contract, the Minister hereby covenants and agrees with the Contractor that, on the full completion by the Contractor of all the work as specified in the contract, within the time specified and limited for the final completion thereof, and to the entire satisfaction of the Engineer, to be evidence by the certificate of the Engineer in writing, he, the said Minister, will well and truly pay or cause to be paid to the Contractor the amount of the Contract price, being the actual quantities in the several items in the schedule of Prices contained in the Tender at the unit prices or bulk sum, prices quoted by the Contractor. This amount paid to the Contractor as above shall include all and every kind of work, labour, superintendence, services, tools, implements, machinery, plant, materials, articles and things whatsoever necessary for the full execution and completion of the work to the entire satisfaction of the Engineer. In case of dispute as to what work, labour, superintendence, services, tools, implements, machinery, plant, materials, articles and things are or are now so included, the decision of the Engineer shall be final and conclusive.

8.0 FINAL PAYMENT. It is hereby agreed between the Parties hereto that the payment of the final amount due under the Contract, and the adjustment and payment of any bills that may be rendered for work done, in accordance with any alteration in or addition to the same, shall release the Minister from any and all claims or liability on account of work performed under the said Contract, or any alteration in, or addition to the same. It is further agreed that before final payment is made by the Department to the Contractor, the Contractor shall furnish the Department with a release on the Release Form attached to this Agreement and identified by the Contractor's signature thereon.

9.0 NO WAIVER. The Contractor agrees that no condoning, excusing, or overlooking by the Minister, or any person acting upon his behalf, or previous occasions, or breaches, or defaults, similar to that for which any action is taken, or power is exercised, or forfeiture is claimed or enforced against the Contractor, shall be taken as a waiver of any provision of the Contract, or as defeating, affecting, or prejudicing in any way the rights of the Minister under the Contract.

10.0 INCORPORATION IN CONTRACT. Department of Transportation and Public Works Standard Specification dated February 1, 1997, Tenders and Special Provisions contained in a list attached hereto, together with the Instructions to Bidders, Release from

All Liabilities and plans are hereby made a part of and incorporated in this agreement as fully and to the same effect as if the same had been set forth at length in the body of the agreement.

11.0 WORKER'S COMPENSATION

11.1 Letter of Good Standing. The Contractor is to provide a Letter of Good Standing from Workers' Compensation Board of Nova Scotia indicating the Contractor is assessed and is in good standing, before any contract is awarded. The Contractor shall remain so for the duration of the contract.

11.2 Letter of Clearance. Upon completion of the work, and prior to the release of the holdback, the Contractor shall provide a Letter of Clearance from Worker's Compensation Board of Nova Scotia indicating the Contractor is assessed and is in good standing.

12.0 CERTIFICATE OF RECOGNITION

12.1 Letter of Good Standing. The Contractor shall provide within forty-eight (48) hours of request, before any contract is awarded, a Certificate of Recognition issued jointly by the Nova Scotia Department of Labour and an occupational health and safety organization approved by the Nova Scotia Department of Labour (such as the Nova Scotia Construction Safety Association), or a valid Letter of Good Standing from an occupational health and safety organization approved by the Nova Scotia Department of Transportation and Public Works indicating that the Contractor is in the process of qualifying for the Certificate of Recognition. The Contractor shall remain in good standing for the duration of the contract.

The Contractor shall provide within ten (10) days after award of contract a copy, provided by each Subcontractor, of their Certificate of Recognition issued jointly by the Nova Scotia Department of Labour and an occupational health and safety organization approved by the Nova Scotia Department of Labour (such as the Nova Scotia Construction Safety Association), or a valid Letter of Good Standing from an occupational health and safety organization approved by the Nova Scotia Department of Transportation and Public Works indicating that the Contractor is in the process of qualifying for the Certificate of Recognition. The Subcontractor shall remain in good standing for the duration of the Contract. Consideration will be given to permitting the Contractor to name additional Subcontractors during the course of the contract (i.e. after the ten (10) days, following award, has expired). In such cases, said Subcontractors shall not be permitted to carry out work on the contract until such time that the Contractor has provided the above information for each Subcontractor so named.

13.0 EMPLOYMENT OF CONTRACTOR AND WORKMEN. It shall be a condition of this contract that, at the time the contract is entered into, the Contractor must be a resident of Canada or if the Contractor is a corporation, it was for a period of at least one year immediately prior to that time, incorporated and carrying on business in Canada or the owners of a majority of the shares of such a corporation were resident, for a period of at least one year prior to incorporation, in Canada. Canadian material is to be used in carrying out the work to the full extent to which it is procurable, consistent with proper economy and the expeditious carrying out of the work. Residents of Canada, only, are to be employed on the work. In employing persons there shall be no discrimination in favour of or against any person by reason of race, sex, religious views or political affiliations.

The following is the practice to be adhered to by all Contractors working on Department contracts and shall apply to materials, as noted in the following, hauled after 12:00 noon, local time, on the date of the tender closing.

The 80-20 rule shall apply to the hiring of local trucks for Department operations. At least 80% of the trucks hired on NSDOT&PW contracts must be private trucks hired, on a rotational basis, through the local branch of the Truckers Association of Nova Scotia, so that all trucks in the area receive a relatively equal amount of work. This is referred to as the 80-20 rule.

13.1 Hauling of Granular Materials and Asphalt Concrete. The 80-20 rule applies to hauling of all granular materials (including rock fill and loose laid rip rap) and asphalt concrete from a pit, crusher or asphalt plant for a Department project. Department Truck Rates to apply.

13.2 Hauling Materials To Produce Granular Materials. The 80-20 rule applies to the hauling of all material which is to be used to produce granular material including stone chips (with exception of material to be used to produce asphalt concrete). Department Truck Rates apply.

13.3 Hauling of Stone Chips For Seals. The 80-20 rule applies to the hauling of stone chips for seals from the site where the stone chips are manufactured to a stockpile location on or near the contract and also from the stockpile on or near the contract to the spreader. Department Truck Rates apply.

13.4 Hauling of Aggregates for Micro Surfacing. The 80-20 rule applies to the hauling of aggregate for Micro Surfacing from the site where the aggregate is manufactured to a stockpile location on or near the contract. Department Truck Rates apply.

13.5 Hauling of Excavation or Borrow Material.

- *Section of Road Not Designated.* The 80-20 rule applies to the hauling of excavation and/or borrow material on a project where the section of road under contract is not designated. Department Truck Rates apply.

- *Part or All of Section of Road Designated.* The 80-20 rule applies to the hauling of excavation and/or borrow material over a non designated section of highway for a project where all or a portion of the section of road under contract is designated. Department Truck Rates apply.

13.6 Hauling of Common and/or Borrow Material. The 80-20 rule does not apply to hauling of common and/or borrow material for a project where the section of road under contract is designated, and the movement of material is confined to the designated limits. Department Truck Rates do not apply.

13.7 Hauling of Blend Sand. The 80-20 rule does not apply to the hauling of material (including blend sand) to be processed into asphalt concrete. Department Truck Rates do not apply.

13.8 One Truck Only. If only one truck is required on a contract the Contractor may use a truck of his own choice. However, to comply with the 80-20 rule, before the Contractor could use another truck of his choice he would have to have a minimum of 8 private trucks employed on the contract provided, of course, private trucks were available.

13.9 General. Granular material is deemed to include all classes of gravel, Special Gravel, Gravel Borrow, Rock Fill, Loose Laid Rip Rap and Fill Against Structure material.

Where Department rates apply, rates paid to all owners of trucks in the employ of the Contractor, Sub-contractor, or of any person doing or contemplating doing, the whole or any part of the work contemplated by the Contractor, shall be at least equal to the rates of pay fixed by the Minister from time to time. It should be noted, however, that the rate to be used when hauling items for which the Contractor is paid on a per tonne basis must be the tonne-km rate.

The rates paid to all labourers or other persons in the employ of the Contractor, Sub-contractor, or of any person doing, the whole or any part of the work for the Contractor shall be at least equal to the rates of pay that may be fixed by the Minister from time to time.

Workmen shall not be required to work longer hours than those fixed by the custom of the trade in the district where the work is carried on, except for the protection of life or property, or in case of other emergencies. In the event of a dispute arising as to wages, or what are the current hours fixed by the custom of the trade, it shall be determined by the Minister whose decision shall be final.

In the event of default being made in payment of moneys owing to any person employed on the said work and if a claim, therefore, is filed in the office of the Minister and proof thereof satisfactory to the Minister is furnished, the said Minister may pay such claim out of any moneys at any time payable by the Minister under said contract, and the amounts so paid shall be deemed payments of the Contractor.

SIGNED, SEALED AND DELIVERED

IN WITNESS WHEREOF the Parties hereto have herewith cause These Presents to be signed, and sealed, on the day and year first above written.

By the Contractor in the Presence of

....

....

Contractor
Witness

SIGNED, SEALED AND DELIVERED
by the Minister in the Presence of

....

....

Minister
Witness

SECTION 4 - GENERAL PROVISIONS

1.0 INVESTIGATION OF EVERY CONDITION OF THE WORK. The contract is made and entered into by the Contractor and the Minister on the distinct understanding that the Contractor had, before execution, investigated and satisfied himself on the character and topography of the county, its streams, water courses and rainfalls, the dimensions, levels, character and nature of all existing works, buildings, constructions, road, lands, waterways, sewers, pipes, the nature of the strata through which excavations, if any, are to be made, and all other things and of every condition affecting the works to be executed and the labour and material to be provided, and that the execution of this contract by the Contractor is founded and based upon his own examination, knowledge, information and judgement, and not upon any statement, representation or information made or given, nor upon any information derived from any quantities, dimensions, tests, specifications, plans, maps, or profiles made, given or furnished, by the Minister or Minister's representative. Any such statement, representation or information, if so made, given or furnished, was made, given or furnished merely for the general information of bidders and is not in anyway warranted or guaranteed by or on behalf of the Minister. No extra allowance will be made to the Contractor by, and the Contractor will make no claim against the Minister for any loss or damage sustained in consequence, or by reason of, any such statement, representation or information being incorrect or inaccurate, or on account of excavating in rock or other difficult ground, or of unforseen difficulties of any kind.

2.0 INTENT OF PLANS AND SPECIFICATIONS. The plans and specifications are to be taken co-jointly, each as explaining the other. The two together shall be held to cover and to be descriptive of any and all work that could reasonably be required to be done, in order to properly complete the work under this contract. Should there be any discrepancy or disagreement between the figures on the plans, and the scale of the same, or between the descriptive writings on the plans, and the specifications, the Engineer shall decide which is to be followed. Should there be anything shown on the plans but not described in the specification, or vice versa, the work shall be fully executed and carried out, just as if fully shown and described in both.

Any and all minor details of the work not specifically mentioned in the specification or shown on the plans, but obviously necessary for the full and proper completion of the work, shall be considered as incidental, and as being a part of and included in the work, to be done under the contract. The Contractor will not be entitled to any extra or additional compensation for such work. Should any dispute arise between the Engineer and Contractor as to the true meaning of the plans and specifications upon any point, the decision of the Engineer shall be final and conclusive. Whenever it is specified that the Contractor must prepare his own plans, the approval of such plans by the Engineer shall be general only and such approval will not relieve the Contractor from any responsibility whatsoever. The Contractor will not be allowed any compensation for such plans and the contract price shall include the cost of furnishing them.

3.0 WHAT ITEMS IN CONTRACT INCLUDE. The description of the work and any portion thereof and of the materials referred to by any item of which a price is given in this contract, includes not only the particular kinds of work or materials mentioned in the said item, but also all and every kind of work, labour, tools, plant, materials, equipment, articles, and things whatsoever necessary for the full execution, completion, and delivery, ready for use, of such respective portions of the works, in accordance with the plans, drawings and specifications, to the satisfaction of the Engineer.

In order to facilitate Department accounting some contracts are made up of two or more Sections as described on the Tender Forms.

If, during the conductance of a Contract which consists of more than one Section, work is authorized by the Engineer for which there is no Tender Item or Unit Bid Price then the work will be carried out by the Contractor, and payment for this work shall be made as per the Tender Unit Bid Price as shown on the Main Section of the Contract. The Main Section of the Contract either shall be designated later in these provisions or shall be determined by the District Director.

4.0 TIME OF COMMENCEMENT. The time of commencement and the rate of progress made with the work shall be such as to ensure its final completion on or before the completion date specified in the contract documents.

5.0 TIME OF COMPLETION. The whole of the work to be done under this contract shall be finally completed in full accordance with all the terms and conditions of this contract on or before the day specified for such completion in the Tender which forms part of this contract. The Contractor shall complete as quickly as it is deemed practicable any portion of the contract upon which he has undertaken work.

6.0 EXTENSION OF TIME. The Department may consider an extension to the completion date of the contract, on the following basis:

- Federal or Provincial Laws passed subsequent to the date of the contract adversely affecting progress.
- When the Contractor is requested by the Department to perform additional work or work beyond the scope of the original tender design, the Engineer will extend the completion date by the same proportion of time as the additional work bears to the original work.
- Delay by the Department in the issuance of any plans, materials, notices or other items which in the opinion of the Engineer interfered with the Contractor's approved start date and/or work schedule.
- Any other conditions which in the opinion of the Engineer warrants consideration for an extension of time.

Failure by the Contractor, in the opinion of the Engineer, to prosecute the work continuously and in the most diligent and efficient manner possible, using every means and alternative methods available to complete the project, will be cause for denial of any such time extension.

Proceeding with the work without a Work Schedule approved by the Engineer in accordance with Clause 1.40.20.3 of these Specifications, or non compliance with said Work Schedule in the opinion of the Engineer, will be grounds for denial of any requested time extension.

No extensions for weather will be considered between April 15 and December 1 whatsoever. The Department may consider an extension or suspension of the Contract between December 1 and April 15 of the following year, if in the opinion of the Engineer, it would be in the best interest of the Department. Liquidated damages as detailed in the contract documents will not be applied for extensions granted by the District Director for the period between December 1 and April 15.

Any extension of time that may be granted to the Contractor shall be so granted and accepted without prejudice to any rights of the Minister whatsoever, under this contract, and no assent thereto on the part of the Contractor shall be necessary.

7.0 CHANGES IN CONTRACT. The Engineer shall have the right and authority at any time, either before the commencement or during the construction of the work, or any portion thereof, to make any changes in the lines or grade or in the dimensions, form, plan, location, position and quantity of the work to be done, or of any part or parts thereof, or in any other thing connected with the work, whether or not such changes increase or diminish the quantity of work to be done, or the cost of doing the same. If the changes diminish, or increase the quantity of work to be done, they shall not constitute a claim on the part of the Contractor for damages, or for any loss of anticipated profits. No changes or omissions shall in any way annul or invalidate the contract, but all additional work or changes in the work contracted for shall be considered and treated as if originally contracted for, and shall be subject to all the terms, conditions and provisions of the original contract. No deviations from the plans or specifications shall in any case be made by the Contractor without a written order signed by the Engineer, setting forth the nature and extent of the changes proposed.

8.0 UNFORESEEN WORK

8.1 Unforeseen Work. Unforeseen work, as defined in Division 1, Section 1 of these specifications, must be authorized and payment provided for by one of the two following methods:

8.1.1 Letter of Quotation. The Contractor shall submit a letter of quotation to the Department containing a unit price or prices for the additional work. The price or prices shall be approved by the Department before the commencement of work.

8.1.2 Extra Work Order. The Engineer shall issue a written Extra Work Order to the Contractor setting out the nature and extent of the extra work proposed. Compensation for the work is to be on a cost plus basis as described below. Statements of account shall be submitted on Department forms. All labour, materials, and equipment used shall be suitable to complete the work described and shall be approved by the Engineer prior to the work being done. Labour rates are to be actual labour rates paid by the Contractor to his employee. Equipment rates are not to exceed those contained in the Department's Schedule of Rental Rates for Construction Equipment. Truck rates shall be Department rates in effect at the time the work is done. Rates for equipment not contained in the Schedule of Rates shall be approved by the Engineer before the work is commenced. In cases where the Contractor does not have his own equipment available to complete the work and must hire equipment, the rate to be paid to the Contractor shall be approved by the Engineer before the equipment is hired. The actual cost of labour, materials, rented equipment and outside services, shall not exceed reasonable market value. The Contractor shall furnish the Engineer with supporting invoices for all materials, outside services and rented equipment for which the rates are not in accordance with the Department Schedule.

The Contractor will be allowed an additional 20% on the actual cost for labour, materials, outside services, and hired equipment. This additional percent is for the use of tools, Contractor's plant (except such plant as rentals have been agreed upon) Superintendent's payroll and profit.

8.2 Refusal to do Work, Claims. In the absence of a written letter of quotation or written Extra Work Order, the Contractor will not be entitled to payment for any such unforseen work. If the Engineer and Contractor fail to agree upon the unit price quoted for the extra work, or the Contractor refuses to carry out the work as described in the Extra Work Order, the Engineer shall have the right to have the work carried out and completed by others. The Contractor shall have no claim for hindrances or delays caused by getting the unforeseen work completed.

In the case of work done under authorization of an Extra Work Order, the Contractor shall submit the necessary forms and supporting documentation to the Engineer within 60 days of the last day of the period during which work was done. The period referred to is the monthly period for which progress payment for work on the contract is normally made.

9.0 ADDITIONAL WORK

9.1 Less than 10% of Original Tender. Additional Work, as defined in Division 1, Section 1 of these specifications, less than 10% of the original tender must be authorized and payment provided for by one of the two methods outlined in Sections 8.1.1 and 8.1.2 of these General Provisions.

9.2 Greater than 10% of Original Tender. If the additional work is greater than 10% of the original tender, the additional items or work will be tendered in accordance with the Government tendering policy or an application for sole sourcing made to the Priorities and Planning Committee.

10.0 WORK NOT IN CONTRACT. The Minister may at any time without payment to the Contractor, send and employ on the work site, other contractors and workmen, with such machinery, tools, plant, equipment, materials and incidentals, as the Engineer may deem necessary to do any work not comprised in the contract. The Contractor shall afford to them all reasonable facilities to the satisfaction of the Engineer for doing such work. The work of the Contractor shall be interfered with as little as the Engineer may deem practicable. The taking of possession of the whole or any part of the work of the Contractor shall not be considered an acceptance by or on behalf of the Minister of the whole or any portion of the work comprised in the contract.

11.0 INSPECTION GENERAL. The Engineer may provide for the inspection of all materials used and work done under the contract by assistants and inspectors, acting under his direction. Such inspection may extend to, and cover all or any parts of the work and also the preparation and manufacture, whether within the limits of the work or elsewhere, of any of the materials to be used, or for the execution and final completion of the said work. Inspectors shall have full authority to reject defective materials or workmanship, and to suspend the carrying out of any work that is being improperly done, subject to the final decision of the Engineer. Inspectors shall have no authority to permit deviations from, or to relax any of the provisions of the specifications, without written permission or instruction from the Engineer, nor to delay the Contractor in any way by failure to inspect material and workmanship, with reasonable promptness, when being notified by him. All materials and workmanship, will be inspected thoroughly and carefully, and the Contractor will at all times be held strictly to the spirit of the specification. All the work must be first-class in every particular and in thorough conformity with the plans and specifications.

12.0 WORK UNDER CONTROL OF ENGINEER. The work shall, in every particular, be under and subject to the control and supervision of the Engineer. All orders, directions or instructions at any time given by the Engineer with respect, thereto, or concerning the conduct thereof, shall by the Contractor promptly and efficiently be obeyed, performed and complied with, to the satisfaction of the Engineer. All instruction and directions or certificates given, or decisions made, by anyone acting under the authority of the Engineer shall be subject to his approval, and may be cancelled, altered, modified and changed as he may see fit. In cases where the Contractor or Minister is dissatisfied with the decision of anyone acting under the authority of the Engineer, an appeal, may be made to the said Engineer, whose decision in the matter shall be final and conclusive.

13.0 ENGINEER'S DECISION FINAL. It shall be distinctly understood that the sole and every part of the work to be done under this contract is to be executed and completed in full accordance with the plans and specifications covering the work, and any further orders or directions or instructions that may be given from time to time by the Engineer in regard thereto, and to the complete satisfaction of the said Engineer, as evidenced by his written certificate, which certificate, shall be a condition precedent to the rights of the Contractor to be paid for the work; and that the said Engineer is to be the sole judge and arbitrator as to the mode and manner in which the work is to be carried out, and as to the efficiency, quality and quantity of the work done or materials furnished under the contract. The Engineer shall also decide any and all questions that may arise as to the meaning or interpretation of the plans and specification, and every other matter and thing incident, to bearing upon or arising out of the plans, specification and contract. His judgement, decision, or award upon any and all such questions shall be absolutely final, binding and conclusive, as between the parties to the contract.

14.0 QUALITY OF WORK AND MATERIAL. All the work shall be constructed of the best materials of their several kinds, and shall be finished in the best and most workmanlike manner, in the manner required by, and in strict conformity with this contract, the plans and specification, and the working or detail drawings, which may from time to time be furnished, and to the complete satisfaction of the Engineer. The judgement and decision of the Engineer as to whether the materials supplied and the work done under the contract comply with the requirements of the plans and specification shall be final and conclusive.

15.0 DEFECTIVE WORK AND MATERIAL. No material shall be used in the work, or any portion thereof until it has been examined and approved of by the Engineer or his authorized representatives. All rejected materials must be removed from the site of the work and replaced with materials which are acceptable to the Engineer. Any work or materials which in the opinion of the Engineer, is not of the character, quality, dimensions, or design, required by the plans and specifications, and which, in the judgement of the Engineer, is otherwise or in any manner defective, imperfect, or insufficient, shall be replaced or remedied, when pointed out to the Contractor by the Engineer; and shall be made good and sufficient by the Contractor at his/her own expense, and to the satisfaction of the Engineer, who shall have found, and whose duty it shall be to have any defective work or materials taken out and rebuilt or replaced at the expense of the Contractor. Any omission by the Engineer to disapprove of or reject any insufficient or imperfect work at the time of any estimate shall not be deemed in acceptance of such work or material.

The Contractor shall, to the satisfaction of the Engineer, rectify any defects in the works which may appear therein, or of which he shall receive notice from the Engineer and for which he may have been responsible, in the opinion of the Engineer, during the period of thirty days after the date of the final certificate of the completion of the work. If the Contractor fails to renew any defective materials, or correct any defective workmanship within 24 hours after he has been instructed to do so by the Engineer, the Engineer may cause any such defective work or workmanship to be removed. The expense of such removal will be deducted from any moneys that may be due, or that may thereafter be or become due to the Contractor. The fact that any defective material or workmanship has been accepted previously by oversight of the Engineer or his representatives shall not be considered a valid reason for the Contractor's refusal to remove it or make it good when notified to do so.

16.0 MATERIALS FURNISHED BY THE DEPARTMENT. When the Department is required to supply materials under this Contract, the Contractor shall decide when materials are required on the work, and shall notify the Engineer giving reasonable advance notice.

The full amount of material in each shipment must be accounted for by the Contractor and any theft or loss, or damage to materials after receipt will be charged against him. Materials supplied to the Contractor by the Department shall not be used by the Contractor for any purpose other than that for which they were supplied. Should any material supplied by the Department be damaged while in possession of or under the control of the Contractor, they shall be replaced by the Contractor at their own expense.

17.0 LINES AND GRADES. The work, and all parts thereof, is to be constructed according to the lines and grades on the plans, and must conform accurately to the same. The lines and grades will be given by the Engineer or his representative, and the Contractor must carefully preserve from injury or disturbance all stakes and bench marks set during the progress of the work for marking lines and grades. Should errors be made by the Contractor in working to the lines and grades as given by the Engineer, such mistakes and errors must be made good by the Contractor at their own expense.

18.0 CONTRACTOR'S PERSONAL ATTENTION.

The Contractor shall give his constant personal attention to the work while it is in progress, or he shall place it in charge of a competent and reliable agent or representative who shall have authority to act for, and be considered the lawful representative of the Contractor. Any orders, or instructions regarding the work, which shall be given to the said agent or representative, shall be considered as given to the Contractor. The Contractor shall at all times employ a sufficient number of workmen or foreman for the proper performance of the work, which he shall prosecute to full completion in the manner and within the time as specified.

19.0 REFUSAL OF CONTRACTOR TO DO WORK. Should the Contractor neglect or refuse to do any work, matter or thing that they may be directed to do, or which may be necessary in order to complete the work in a proper manner according to the plans and specification, the Engineer may without further notice perform or do whatever in their judgement may be necessary. The entire cost shall be borne and paid by the Contractor, and may be deducted and paid out of any moneys which may be due or may thereafter become due the Contractor.

All machinery and other plant, materials, tools, equipment, articles and things whatsoever provided by the Contractor for the works hereby contracted for and not rejected or condemned for any reason shall, from the time of their being so provided, become, and until the final completion of the said work, shall be and remain the property of the Minister for the purposes of the said work; and the same shall on no account be taken away or used or disposed of otherwise, except for the purpose of the said work, without the written permission of the Engineer; and the Minister shall not be answerable for any loss or damage whatsoever which may happen to such machinery or other plant, materials, tools, equipment, articles and things, provided that always, upon the completion of the work and upon payment by the Contractor of all such moneys, if any, as shall be due from him to the Minister, such of the said machinery and other plant, materials and things, as shall not have been used and converted in the works, and which remain undisposed of, shall upon demand be delivered up and returned to the Contractor in such condition, as they may then be in.

Whenever on this contract, power or authority is given to the Minister, the Engineer or any person on behalf of the Minister to take any action consequent upon the happenings of any one of the events mentioned or referred to in the contract, or upon the acts, defaults, neglects, delays, breaches, non-observance or non-performance by the Contractor in respect of the works or any portion or details thereof, such powers or authorities may be exercised from time to time and not only in the event of the happenings of such contingencies before the time limited in this contract for the completion of the works, but also in the event of the same happenings after the time so limited in the case of the Contractor being permitted to further proceed with the execution of the work.

20.0 POWER TO EMPLOY ADDITIONAL RESOURCES

20.1 Insufficient Materials and/or Equipment. Notwithstanding the obligation of the Contractor to complete the contract within the time specified, where the Engineer is satisfied that the number of workers, equipment or materials used by the Contractor for the contract is insufficient to complete the contract within the time specified, the Engineer may, by written notice to the Contractor, require the Contractor to employ or provide such additional workers, equipment or materials as the Engineer may deem necessary to complete the contract within the time specified at the expense of the Contractor.

20.2 Employment of Additional Workers, Equipment, Materials by Minister. Where the Engineer is satisfied that the slow rate of progress on the contract is endangering the safety or health of any person or exposing part of it or public property to damage or destruction, the Engineer may either on behalf of the Minister or, if he sees fit as an agent or of account of the Contractor, but in either case at the expense of the Contractor, provide and employ such additional workers, equipment or materials as the Engineer thinks proper to diligently carry out the contract, and may pay such additional workers such wages, and for such additional equipment and materials, respectively, such prices as the Engineer thinks proper. All such wages and prices respectively are thereupon at once to be paid by the Contractor or the same may be retained or deducted out of any sum that may then, or thereafter, become due from the Minister to the Contractor; and the Minister may use in the execution and advancement of the contract not only the workers, equipment and materials so provided on their behalf, but also all such as may have been, or may be provided by, or on behalf of the Contractor.

20.3 Schedule of Work. The Contractor will be required to submit a schedule of work in accordance with the completion date of the project. No work shall commence until a work schedule has been provided to, and approved by the Engineer. The Engineer, may, during the course of the contract, require the Contractor to produce a revised schedule of completion indicating what additional workers, machinery, tools or other plant and equipment or the quantity of proper materials required to successfully conclude the contract within the completion date of the project.

21.0 SUBLETTING OR ASSIGNING OF CONTRACT. The work under this contract shall be performed by the Contractor, and by workers under the Contractor's immediate supervision and superintendence. The Contractor shall not, without the written consent of the Engineer, make any assignment of this Contract, or any subcontract for the execution of any of the works hereby contracted for.

This clause does not apply to the furnishing of materials for the different parts of the work, for which materials, however, the Contractor shall be held strictly responsible, and no excuse for the quality of the materials, or for the non-delivery of the same in good time by any Subcontractor, as effecting the progress of the work, will be entertained. In no case shall any assignment or subcontract, even though duly consented to, relieve the Contractor from his liability under this contract for the performance and completion of the works hereby contracted for. The Contractor shall not assign any moneys due or accruing under the contract under any circumstances.

22.0 DELAYS BEYOND TIME LIMIT. No delay or delays within or beyond the time fixed for the completion of the work shall vitiate or render void the contract or any part thereof, or the obligations imposed upon the Contractor no delay shall make void or in any way impair or affect any current or other bond, guaranty, security, or obligation for the performance of the contract; the Contractor shall not have, nor make any claim or demand, nor bring any action, suit or petition against the Minister for any damage which he/she may sustain by reason of any delay or delays, from whatever cause arising in the progress of the work.

23.0 CONTRACTOR LIABLE FOR RISKS. The Contractor shall assume all risks and contingencies in connection with the work, and shall bear all loss or damage whatsoever, whether arising from storms, floods, fires, accidents or any other cause whatsoever which may occur to the works or any part thereof, during the progress of the work and until the same shall be fully and finally completed and delivered up to and accepted by the Minister. If any such loss or damage shall occur before such final completion, delivery and acceptance of the work, the Contractor shall immediately, at their own expense, repair, restore and re-execute the work so damaged within the specified time for completion. The Contractor must make good at his own expense all deficits and failures from any causes whatsoever, whether the same are due to negligence on his part, or on the part of his workmen, or persons employed by the Contractor, or under their control, or due to bad workmanship; and the Contractor shall indemnify and save harmless the Minister from any and all claims, losses or damages in respect thereof.

24.0 CONTRACTOR LIABLE FOR DAMAGES. The Contractor, agents and all work persons and persons employed by the Contractor or under the Contractor's control, and all servants and agents of his Subcontractor, if any, shall use due care that no person or property is injured and that no rights are infringed in the prosecution of the work. The Contractor shall be solely responsible for all damages, by whomsoever claimable, in respect of any injury to persons or to property of whatsoever description, and in respect of an infringement of any right, privilege or easement whatsoever, occasioned in the carrying on of the works or any part thereof, or by any neglect, misfeasance or non-feasance on the Contractor's part or on the part of any of his agents, workmen or persons employed by him or under his control or any of his Subcontractors, their servants or agents, and shall at his own expense, make such temporary provisions as may be necessary to ensure the avoidance of any such damage, injury or infringement, and to prevent the interruption of, or damage or menace to, the traffic on any public or private road, and to secure to all persons and corporations the uninterrupted enjoyment of all their rights, in and during the performance of the said works. The Contractor shall indemnify and save harmless the Minister from and against all claim and demands, loss, costs, damages, actions, suits or other proceedings by whomsoever made, brought or prosecuted, in any manner based upon, occasioned by, or attributed to any such damage, injury or infringement.

25.0 GRAVEL REMOVAL FROM RIVERS. In order to avoid situations whereby Contractors on highway work might destroy valuable fish spawning grounds by removing gravel from river beds, no work shall be done in, or material removed from the bed of a stream without the specific consent of the Project Engineer.

26.0 CLAIMS AGAINST CONTRACTOR. The Contractor shall promptly pay for all labour, services and materials, in or about the construction of the work; and all payments for such purposes, shall be made by the Contractor, at least as often as payments are made by the Minister to the Contractor. Payments to truckers employed in the hauling of materials used in the construction, shall be made bi-weekly with payment for one pay period made prior to the end of the following pay period.

Where a Subcontractor or supplier claims not to have been paid the amount owning under contract within 30 days after it is due, the Subcontractor or supplier may file a notice of claim with the Minister within 60 days after the initial 30 day period. The Minister will give notice of the Subcontractor or supplier's claim to the Contractor and retain the disputed amount until the claim is settled by the parties. If the Minister has not been advised within 60 days from the date of the notice of claim that the claim is settled by agreement, subject to an agreed upon dispute resolution process or that judicial proceedings have been commenced, the Minister will pay the disputed amount to the Contractor

Before final settlement is made for work done and materials furnished under the contract, the Contractor may be required to furnish evidence satisfactory to the Minister that the said work and all its parts are free and clear from all lawful claims or liens under any law, for labour, workmanship, material or otherwise; and that no claim then exists, in respect of which a claim or lien upon the said work could, or might attach. The Contractor shall indemnify and hold harmless the Minister, and all his property, from any and all kinds of liens, occurring from labour and services performed and materials furnished, or otherwise, and any of the same, in or about the said work. In the event the Minister consents in writing to any subcontract for the execution of any work hereby contracted for, the Contractor shall ensure that all accounts for labour, services and materials in or about the construction of that part of the work are paid by the Subcontractor and shall furnish for the Minister a certificate in writing that such accounts have been paid.

27.0 CLAIMS OF CONTRACTOR. It is intended that every allowance to which the Contractor is fairly entitled will be embraced in the Engineer's monthly certificate; but, should the Contractor at any time have claims of any description which he considers are not included in the said certificate, such claims must be made in writing to the Engineer within 30 days after the date of the delivery to him of the certificate, from which he considers the items of his claims to have been omitted, and in no case beyond the period of 60 days from the date of the practical completion of that portion of the work, to which such claims apply. In default of the presentation of such claims within the time or times so limited, the Minister may treat such claims as absolutely barred. The Contractor in presenting claims of the kind referred to above, must accompany them with satisfactory evidence of their accuracy, and the reasons for the claims.

Where after the tender closing date for this contract, there is a change in the amount of Federal Excise Tax or Import Duties payable on materials placed or furnished or to be placed or furnished in the work, the Department will increase or decrease contract payments by the amount necessary to offset the effect of the Tax or Import Duties on this contract.

Claims by the Contractor for compensation to cover increased costs caused by the Tax or Import Duties must be submitted to the Engineer within **30 days** after the **Engineer's Certificate of Final Estimate** is received by the Contractor. No claim submitted beyond the 30 day limit will be considered.

Where the Contractor benefits from a change in the Tax or Import Duties, the Contractor shall submit to the Engineer a statement of such benefits. This statement must be provided within **30 days after the Engineer's Certificate of Final Estimate** is signed.

The Engineer reserves the right to make deductions from regular progress payments to account for any estimated benefits accrued to the Contractor from the Tax or Import Duties. Such deductions will be held pending receipt of the above mentioned statement itemizing the benefits which the Contractor has received from the Tax or Import Duties, at which time the final payment adjustment will be determined. (See also Division 1 Section 2 Paragraph 6 of these Specifications)

28.0 SANITARY PROVISIONS. All Contractors shall provide and maintain in a condition satisfactory to the Engineer all necessary accommodations for the use of their employees on the work.

29.0 CHARACTER OF WORKMAN AND EQUIPMENT. The Contractor shall at all times employ sufficient labour and equipment for prosecuting the several classes of work to full completion in the manner and time specified.

Any person employed by the Contractor, who, in the opinion of the Engineer, does not perform their work in a proper and skilful manner, or is disrespectful, intemperate, disorderly, or otherwise objectionable shall, at the written request of the Engineer, be forthwith discharged and such persons shall not again be employed in the work.

All machinery and equipment owned or controlled by the Contractor, which is proposed to be used on the work shall be of sufficient size and in such mechanical condition as to meet with the requirements of the work, to produce a satisfactory quality of work. The Engineer may order the removal and require replacement of any unsatisfactory equipment.

No change in the machinery and equipment employed on the work, which shall have the effect of decreasing its capacity, shall be made except by written permission of the Engineer. The measure of the capacity of machinery and equipment shall be its actual performance on the work.

30.0 RECORDS OF CONTRACTOR OPEN FOR INSPECTION. The Contractor shall keep complete records of the time worked by each of their employees on this work, and such pay-rolls, time books, books or accounts, invoices and statements shall be at all times open for inspection and audit by the Minister or Minister's representative, who shall be assisted in every possible way by the Contractor to enable the Minister or such representative to ascertain as far as possible, the exact payment, sums or claims so due and remaining unpaid by the Contractor.

31.0 NOTICE TO CONTRACTOR. Any notice, order, direction or other communication mentioned in this contract to be notified, or given the Contractor, shall be deemed to be well and sufficiently notified or given, if the same be given by the Engineer or Engineer's representative, and be delivered to the Contractor personally or the Contractor's representatives or foreman on the work, or left at the Contractor's office, or mailed in any post office to the Contractor or his agent, addressed to the address mentioned in this Contract, or to the Contractor's last known place of business or residence.

32.0 CLEANING OF PREMISES. The Contractor shall upon completion of the work remove all temporary structures and clear away all rubbish, surplus and waste materials remaining on or about the works and place the premises in a neat and tidy condition satisfactory to the Engineer.

33.0 FIRE PROTECTION. The Contractor shall, at his own expense, take special precautions to prevent fire occurring in or about the works, and employ his own workmen, to the satisfaction and under the direction of the Engineer, in extinguishing all such fires which may occur. The Contractor shall observe and comply with all laws and regulations and instructions made and given, from time to time during construction, by the Engineer, with respect to fires and the prevention and extinguishing of fires, and shall pay all wages and other costs occasioned by reason of the observance or compliance with such regulations and instructions.

34.0 ACCOMMODATING TRAFFIC AND TRAFFIC CONTROL. Unless otherwise provided, the Contractor shall, at his own expense and without extra cost to the Minister, make suitable provision to accommodate all traffic, either pedestrian or vehicular over any part of the highway upon which work is being performed, in a manner satisfactory to the Engineer and shall arrange to keep two lanes of highway open to traffic at all times with the least amount of inconvenience to the travelling public. On upgrading work the subgrade shall be completed progressively in order that the various courses of gravel may follow in an orderly manner. The grading operation shall not precede the gravel operation by a distance greater than 1 km and not more than 1 km of the original travelled way shall be disrupted at any one time. However, other work not affecting the original travelled way may proceed as directed by the Engineer.

Prior to closing down the operation on each working day, the Contractor shall ensure that the travelled way is capable of carrying traffic even under adverse conditions. The reconstructed travelled roadway is to be well maintained and graded on a daily basis by the Contractor as directed by the Engineer until the completion of the Contract.

Where in the opinion of the Engineer, it is desirable to;

- **detour traffic via alternate highways** because of construction work on a project **and**
- where **short detours** are required around excavations, partially built structures, etc., on work under contract, the Contractor is to be paid for the cost of construction and maintenance of the detour.

The Contractor is advised that construction signs for any contract shall not be erected until immediately prior to the commencement of work.

The Contractor shall be responsible to provide and maintain all traffic control required on the Contract. Traffic Control shall be carried out in accordance with the current edition of the Nova Scotia Traffic Control Manual and as directed by the Engineer.

The Contractor shall provide an Accredited Traffic Sign Supervisor, who has successfully completed the Temporary Workplace Traffic Control Training Course to be on site at all times when active construction is taking place, to ensure the dismantling of all temporary condition signs and devices that indicate to the road user that highway construction activities exist and also to ensure that proper traffic control procedures are carried out in accordance with the Nova Scotia Traffic Control Manual.

The Contractor may, if so requested by the Engineer or other approved traffic authorities, be required to submit a list of workmen to whom concerns about the condition of all or any, of the Traffic Control devices, required for the Contract, can be directed during non active construction periods.

Traffic Signs will be supplied to the Contractor by the Department. Traffic signs will be available at the Engineer's Field Office.

Signs, including hazard markers, not returned at the end of the job, will be charged to the Contractor at **100%** of replacement cost.

Drums and Cones required for Traffic Control shall be supplied by the Contractor at no cost to the Department.

All TC-5 (ROAD WORK) and TC-6 (TRAFFIC CONTROL PERSON AHEAD) signs used on any job shall be equipped by the Contractor with two flags (including flag holder), at no cost to the Department, as per the requirement of the Nova Scotia Traffic Control Manual. All signs shall be Level I reflectivity as per specification 62-GP-11M.

All costs associated with the handling, erection, placement and removal of traffic signs, cones and drums, including the maintenance of such during inactive construction periods, shall be incorporated into the tender prices for other contract items.

Traffic Control Persons and Flashing Light Units will be provided and paid for as specified in Division 6 Section 3 - *Traffic Control Persons* and Division 6 Section 4 - *Flashing Light Units* in these Standard Specifications.

On low volume roads and low volume urban residential streets where a 360 degree amber light is required in the placement and dismantling of safety devices, the 360 degree amber light (and vehicle) will be supplied by the Contractor at no cost to the Department.

Unless specified elsewhere in these provisions it shall be the Contractor's responsibility to erect and maintain all signs relative to any contract to meet the requirements laid down in the current edition of the Nova Scotia Traffic Control Manual.

35.0 DESIGNATED HIGHWAYS. The Minister as provided for in Section 6 of the Regulations respecting the Weights and Loads of Vehicles made pursuant to the provisions of Section 172 of the Motor Vehicle Act will designate certain portions of highways as follows with or without a formal request having been made as indicated.

35.1 Grading Contracts.

35.1.1 The section of highway under contract excepting all bridges will be designated at the time said contract is awarded without formal request from the Contractor.

35.1.2 Bridges within the limits of the contract may be designated on formal request from the Contractor provided the structure is deemed capable of bearing the increased loading. The Contractor may be required to reinforce the structure to the satisfaction of the Engineer.

35.1.3 Sections of highway and bridges therein that may be used for purposes incidental to a highway under contract may be designated on formal request from the Contractor. The Contractor may be required to reinforce the structure to the satisfaction of the Engineer.

35.2 Upgrading Contracts.

35.2.1 A section of highway under an upgrading contract may be designated on formal request from the Contractor provided the request is favourably recommended by the District Director, except the designation will not be permitted on any paved highway or paved portion of the contract. If a paved surface is to be pulverized, designation will be considered.

35.2.2 Bridges within the limits of the contract may be designated on formal request from the Contractor provided the structures are deemed capable of bearing the increased loading. The Contractor may be required to reinforce the structure to the satisfaction of the Engineer.

35.2.3 Sections of highway and bridges therein that may be used for purposes incidental to a highway under contract, may be designated on formal request from the Contractor. The Contractor may be required to reinforce the structures to the satisfaction of the Engineer.

35.3 Paving Contracts.

35.3.1 A section of highway under a paving contract may be designated on formal request from the Contractor provided the request is favourably recommended by the District Director, except the designation will not be permitted on any paved highway or paved portion of the contract.

35.3.2 Sections of highway and bridges therein that may be used for purposes incidental to a highway under contract, may be designated on formal request from the Contractor. The Contractor may be required to reinforce the structures to the satisfaction of the Engineer.

35.4 Repaving Contracts. A section of highway under a repaving contract will not be designated because of its paved surface. If the surface is to be pulverized, then consideration may be given to the designation.

A section of highway designated by the Minister is only designated with respect to vehicles owned or hired by the Contractor or his Subcontractor and being used to do work on the contract.

The Contractor shall, at no cost to the Department, carry out grading, gravelling, and dust control operations on the designated road(s) as required to maintain a riding surface acceptable to the Department during the course of the operation. Said road(s) shall be left in a condition acceptable to the Department on completion of the work.

36.0 REGISTERED WEIGHT AND AXLE WEIGHT. The maximum permitted weight on an axle, combination of axles, vehicle or combination of vehicles on any public highway in Nova Scotia shall be in accordance with Regulations Respecting the Weights and Loads of Vehicles made pursuant to Section 191 of the Motor Vehicle Act, Chapter 293 R.S.N.S. 1989 as amended by 1990 c.36 by the Minister and in effect at the time the vehicle (or axle) is in use.

37.0 WEIGHING PROCEDURES. The weighing procedures to be followed by Department weighers on contract or Department work will be carried out on the basis of determining "Pay Load" only.

Trucks hauling on contract or Department projects, and weighed by Department weighers **will not be issued a weight slip if the total gross is in excess of the vehicle's registered weight plus the allowable axle tolerance.**

A sign which reads as follows **must be prominently displayed on each scale house so that it can be easily read by the Truck Driver.**

> **THIS SCALE WILL DETERMINE PAY LOAD ONLY. NO WEIGHT SLIP WILL BE ISSUED IF THE TOTAL LOAD EXCEEDS REGISTERED WEIGHT PLUS TOLERANCE. THE DRIVER IS LEGALLY RESPONSIBLE IF THE AXLE WEIGHT ON HIS VEHICLE EXCEEDS THE PERMITTED MAXIMUM AXLE WEIGHT PLUS TOLERANCE. AXLE WEIGHT WILL BE CHECKED PERIODICALLY BY MOTOR VEHICLE INSPECTORS.**

The scale house sign is available from the Department Sign Shop at Truro as Number 05.

The truck driver is legally responsible to ensure that the legal axle limits plus tolerances are not exceeded.

If possible, the truck axles or axle groups should be weighed during the first several days of the trucking operation and the gross load should be near the permitted registered weight.

To assist the trucker in meeting the legal regulations Department weighers will:

37.1 Initial Weighing of Axles. Weigh axles or axle groups on each loaded vehicle once during the initial phase of the truck operation and advise the trucker of the axle loadings.

37.2 Additional Weighing of Axles. Following the initial axle weighing, subsequent weighing of axles will be done at the trucker's request. The trucker is to be advised accordingly.

37.3 WEIGHING WILL BE PERMITTED UNDER THE FOLLOWING CONDITIONS:

- **Single Weighing Procedure**. Prior to proceeding onto the scale platform, vehicles shall come to a complete stop. The vehicle shall then be driven onto the platform at a minimum speed and shall be gradually stopped centred on the platform. Before weighing, the brakes shall be released to insure there is no displacement of the scale components.
- **Split Weighing Procedures.** The practice of split weighing, for purpose of payment, is not permitted on Department contracts.

38.0 TRUCK WEIGH SCALE

38.1 Contractors Responsibility to Supply Scales. It is the Contractor's responsibility to supply, install and maintain in good working order, truck weigh scales approved for use by Industry Canada, Measurement Canada for weighing various materials such as gravels, asphalt concrete, rock fill, etc. on contracts or Department projects. All costs related to supply, installation and maintenance of scales shall be included in the unit price for the various materials to be weighed. Such scales will be tested occasionally by Industry Canada, Measurement Canada and/or the Engineer or his staff. The Contractor shall supply scales of sufficient length to accommodate weighing of all trucks, used on the contract, by the single weighing procedure.

Contractors have the option of combining scales of the same make and model. Once this is done the Contractor must have these scales checked and certified by Measurement Canada as they are considered new scales. All costs associated with checking of these scales will be the responsibility of the Contractor.

If the vehicle scales from which Department weigh slips will be issued, are not located between the pit and a public road or if the asphalt plant is equipped with certified hopper scales, the Contractor must provide a suitable weighing mechanism (including weigher), at the pit so vehicle weights can be checked. Approximate weights can be determined by using loader scales or by split weighing on a smaller set of scales located at the pit.

If scales in a pit are located more than 500 metres from the point of loading, a dump location must be available at the scales. If a truck is required to travel more than 500 metres within the pit to dump excess material, the Contractor must reimburse the trucker for their travelling (tonne-km) and carrying of this excess material.

The scale and scale house must comply with the requirements of the **Occupational Health and Safety Act and Regulations.**

38.2 Contractors Responsibility to Supply Test Weights. It is the Contractor's responsibility to supply, at his expense, 10,000 kg of certified test weights to carry out the necessary testing.

Test weights shall be inspected and certified for use by Industry, Canada, Measurement Canada at least once annually. The inspection shall be done prior to use of the weights in any particular year. If at any time it is suspected that the mass of the test weights has changed through damage or otherwise, they may be rejected by the Engineer until such time as they are re-certified. It is the Contractor's responsibility to make all arrangements and bear all costs with respect to the certification of the weights. The certification shall be carried out at facilities as specified by Industry Canada, Measurement Canada.

38.3 Scale Beam Calibration. The scale beam or other mass indicating device shall be calibrated in metric units, as frequent as required.

38.4 Scale Testing and Certification. All truck weigh scales shall be tested and certified by an inspection company approved by the Department before being used. Arrangements for the testing will be made by the Engineer once the Engineer is advised by the Contractor that the scales are ready for inspection and test weights are available and the Engineer is satisfied that the scales are functioning properly. Normally, at two (2) week intervals during the period the scales are in use, Department personnel will perform reinspection of the scales. It will be the responsibility of the Contractor to provide personnel to handle test weights and to make adjustments if required during the testing procedure. The Contractor shall also make available a loaded tandem truck to be used during the test procedure, all at no cost to the Department.

Industry Canada, Measurement Canada may conduct unscheduled inspections at any time. If during the process of carrying out this unscheduled inspection, the scales are non-verified or seized due to measurement errors, a re-inspection and certification by Measurement Canada must be performed before the scales may be used for issuing weigh slips. All costs associated with having the scales re-inspected by Measurement Canada are at the Contractor's expense.

The Department, or its representative, is responsible for inspecting the vehicle scales and/or asphalt plant hopper scales for accuracy and compliance with the Weights and Measurements Act and Regulations prior to being used for the first time in the construction season. In addition, the Department is responsible for inspecting scales that have been moved and set up in a new location during the construction season.

The Department will bear the cost of the initial scale inspection for each installation required to complete work on a project. In the event that scales do not pass the initial inspection, costs associated with subsequent re-inspection(s) will be paid for by the Department and the Contractor will reimburse the Department for all costs associated with the re-inspections.

38.5 Requirements Of Portable Scale Houses. A weatherproof scale house shall be provided by the

Contractor. It shall have a minimum floor area of 2.25 square metres, a ceiling height of 2.15 metres and a minimum of 0.91 metres free area measured from the back wall. Safe access via steps, etc. shall be provided to the doorway, which shall open outwards (access to meet all required codes). The door shall have a locking device and a key shall be provided to the weigher. The door shall be located on either of the walls perpendicular to the scale platform or the wall parallel to, and furthest from, the scale platform. Two sliding windows with screens shall be provided; one on the end of the scale house to provide a clear view of vehicles as they approach the scale platform; the other on the scale platform side of the scale house from which the weigher can transfer the weigh ticket to the truck driver. A storage area for a water container shall be provided (container and water shall be supplied by the Department) as well as an adequate stool and work surface for a ticket machine. Adequate heat and light sources shall be provided when required (both to meet all required codes). Toilet facilities must be readily available.

The floors of the scale house shall be insulated and the side walls shall be insulated if the scales are in use outside of the period May 15 to September 15. If dust is a problem, measures shall be taken to suppress it around the scale house or an adequate ventilation or filter system to handle dust shall be provided. Vehicles shall be weighed in such a manner that exhaust fumes are directed away from the scale house.

Before either the inspection company approved by the Department or the Engineer test the weigh scales for accuracy and performance characteristics, the scale and its installation shall be given a thorough inspection. The certification of scales will depend, in part, on the following conditions being met:

- The beam stand shall be rigid and supported to prevent springing under load and vibrating when a loaded vehicle drives onto the scale platform.
- The connecting rod between the weigh beam and the lever system shall be plumb and have ample clearance where it passes through the scale house floor.
- The various components of the weigh beam including pivots, bearings and beam notches shall be clean and free from rust and wear. The weight indication must be readable. The nibs, dogs or pawls shall engage positively in the beam notches. The balance ball must be secured in position when the beam is brought to balance.
- The counter balance hangers shall not have loose material or easily removable weights hung from them.
- The scale operator must have an unobstructed view of the scale platform.

38.6 Scale Deck. The scale deck shall have an easy free floating movement with ample clearance at the ends and sides. The end walls or abutments shall be adequately separated to prevent displaced ramp materials from rolling into the pit and packing about the levers.

38.7 Curb Rails and Guide Post System. All scales used on Department contracts shall comply with the following:

- **Curb Rail**. Where the width of the scale platform permits, a curb rail system shall be installed on both sides of the platform.
  The curb rail system shall consist of either:
  - 200 mm x 200 mm timbers bullnosed on the inside or;
  - 200 mm high steel rail welded to the scale beam.
- **Single Rail and Guide Posts**. Where the width of the scale platform does not permit the installation of a curb rail system on both sides of the platform, a single rail shall be installed on the scale house side. Guide posts shall be installed on the other side.

  If guide posts are used they shall be placed at both ends of the scale and aligned with the edge of the platform and preferably be constructed of minimum 75 mm diameter steel pipe or equivalent.
- **Guide Posts**. Where a scale house is located more than 3.7 m from an elevated scale platform, there shall be four guide posts installed at the corners of the scales as a guide for the truck drivers in lieu of a curb rail system.
- **Curb Rail Not Required**. Where the scale platform is flush with the ground level or other surfaces, a curb rail system is not required.

38.8 Foundations. Scales must be level at all times to operate properly. The type of foundation required will depend largely on the soil condition and length of time of intended use in that location.

Shims and other means of height adjustment shall be made of any suitable material that resists compression at least as well as the main support structure, and shall cover the entire area under the lever stands or load cell bases to ensure that the scale remains stable and level under normal conditions of use of the scale.

38.9 Drainage. Proper drainage of the area surrounding the pit shall be provided. This may require ditching or drainage tiles, etc. depending on the length of time the scale is to remain on the site. Water shall not be allowed to undermine the foundation. The area under the scale shall be free of all debris, old roots, sand, gravel, etc.

38.10 Approach Ramps. The approach ramp and off ramp shall be level (0 degree incline) for at least the length of the longest vehicle being weighed. The area under the approach ramps shall be free of all debris, old roots, sand, gravel, etc. and the ramps shall be firm and well compacted to prevent settling. The ramps shall be inspected regularly and any ruts or settlement corrected immediately.

38.11 Lever System. Levers must be in alignment, level and free of rust. The pivots and bearings must be clean, free of rust and wear. Anti-friction plates or caps or any other mechanical means used to limit side play or movement of knife edges in their bearings should be replaced, if missing.

38.12 Inspections, Tests, Allowable Tolerances. After a thorough inspection of the scale components, either the inspection company approved by the Department or the Engineer shall determine the accuracy of the scale. Scale tolerances and test weight requirements for certification shall be as illustrated in Table 1-4-1. Inspection shall involve the following tests:

- "zero balance"
- "sensitivity" (load discrimination)
- "preliminary performance" test which indicates the general condition of the scale and its installation.
- "strain load test"

38.13 In General. Any additional requirements contained in legislation will take precedent over requirements contained herein.

Table 1-4-1 AGREEMENT BETWEEN DEPARTMENT OF TRANSPORTATION & PUBLIC WORKS AND MEASUREMENT CANADA REGARDING SCALE TOLERANCES, IN SERVICE LIMITS OF ERROR

Verification scale interval	2 kg	5 kg	10 kg	20 kg
In-Service LOE in Terms of Verification Scale Interval	Load in kg	Load in kg	Load in kg	Load in kg
1	0 - 1000	0 - 2500	0 - 5000	0 - 10000
2	+1000 - 2600	+2500 - 6500	+5000 - 13000	+10000 - 26000
3	+2600 - 4200	+6500 - 10500	+13000 - 21000	+26000 - 42000
4	+4200 - 5800	+10500 - 14500	+21000 - 29000	+42000 - 58000
5	+5800 - 7400	+14500 - 18500	+29000 - 37000	+58000 - 74000
6	+7400 - 9000	+18500 - 22500	+37000 - 45000	+74000 - 90000
7	+9000 - 10600	+22500 - 26500	+45000 - 53000	+90000 - 106000
8	+10600 - 12200	+26500 - 30500	+53000 - 61000	+106000 - 122000
9	+12200 - 13800	+30500 - 34500	+61000 - 69000	+122000 - 138000
10	+13800 - 15400	+34500 - 38500	+69000 - 77000	+138000 - 154000
11	+15400 - 17000	+38500 - 42500	+77000 - 85000	+154000 - 170000
12	+17000 - 18600	+42500 - 46500	+85000 - 93000	+170000 - 186000
13	+18600 - 20200	+46500 - 50500	+93000 - 101000	+186000 - 202000
14	+20200 - 21800	+50500 - 54500	+101000 - 109000	+202000 - 218000
15	+21800 - 23400	+54500 - 58500	+109000 - 117000	+218000 - 234000
16	+23400 - 25000	+58500 - 62500	+117000 - 125000	+234000 - 250000
17	+25000 - 26600	+62500 - 66500	+125000 - 133000	+350000 - 266000
18	+26600 - 28200	+66500 - 70500	+133000 - 141000	+266000 - 282000
19	+28200 - 29800	+70500 - 74500	+141000 - 149000	+282000 - 298000
20	+29800 - 31400	+74500 - 78500	+149000 - 157000	+298000 - 314000
21	+31400 - 33000	+78500 - 82500	+157000 - 165000	+314000 - 330000
22	+ 33000	+82500	+165000	+330000

The in-service limits of error that apply to a Class IIIHD weighing device are ±1 e where the load is not less than zero and not more than 500 verification scale intervals, and where the load exceeds 500 verification scale intervals, calculated by adding ±1 e for each additional 800 verification scale intervals or less, to a maximum of ±22 e.

39.0 CONDITION OF ROADS IMMATERIAL. Whenever it becomes necessary to transport the Contractor's plant, machinery or materials over roads adjacent to or leading to the work under this contract, the Contractor shall have no claim against the Minister for any cost or delays that may be incurred or occasioned by reason of the condition of said roads, or of any bridge or obstruction.

40.0 PATENTED DEVICES, MATERIALS AND PROCESSES. The Contractor shall indemnify fully the Minister against all suits or actions arising from the claims of any person or persons who are, or claim to be, the patentees of any process used in connection with the work, or of any materials, plant machinery, tools or appliances, used therein, or thereon, or in any way in connection therewith.

41.0 BORROW, GRAVEL AND PLANT MIX AGGREGATE PITS AND PLANT SITES. All excavation work carried on outside of normal highway embankments for the purpose of supplying common, rock, gravels, and plant mix aggregates, or for providing a hot mix plant site, shall be done under the direct supervision and with prior approval of the Engineer. Except in areas where it is impractical to do so, all such excavations shall not be visible from the Highway.

The work shall be carried out in such a way that all waste material from clearing, grubbing, screening, and material selection operations will be disposed of properly in a manner that will not present an unsightly appearance or endanger or pollute the adjacent lands, rivers, lakes, or other water courses.

On completion of the work, the perimeter of the area shall be uniformly sloped, all waste material including boulders, grubbing, asphalt spillage, etc., shall be properly disposed of and the entire excavation area shall be uniformly graded and adequately drained in preparation for possible future seeding by the Department, all in accordance with the Pit and Quarry Regulations in effect at the time of the award of the contract and to the satisfaction of the Engineer.

42.0 LAND ACQUISITION. At the time of award of a contract all the required right-of-way may not have been acquired by the Department. The Contractor is not permitted to work on any section of a contract until first obtaining permission from the Engineer. Delays in acquiring the necessary right-of-way by the Department shall not constitute a claim on the part of the Contractor for damages or for any loss of anticipated profits.

43.0 PAYMENTS. Cash payments equal to 90% of the total value as shown on the Financial (Progress Estimate) Report done, as valued by the Engineer, will be made to the Contractor monthly, as the work progresses, on the written certificate of the Engineer that the work for, or on account of which the certificate is granted, has been duly executed to the Engineer's satisfaction, and stating the value of such work as computed by him, and the said certificate, shall be a condition precedent to the right of the Contractor to be paid the said percentage, or any part thereof. The Engineer may after the value of the work done exceeds one half the aggregate amount of the tender, increase the cash payments to 95% of the value of the work done. No such monthly payment shall be construed to be an acceptance of any defective work or improper materials. Whenever the work is finished, according to the plans and specifications the Engineer shall certify the final estimate which signifies that the work is done to his satisfaction. Subject to the other provisions of this contract the Minister will then pay to the Contractor within 60 days, but not before 30 days, after execution of the said final certificate the remainder which shall be found to be due, excepting therefore such sum or sums as may be lawfully deducted or retained under any of the provisions of the contract. The written certificate of the Engineer certifying to the final completion of the said work to his/her entire satisfaction shall be a condition precedent to the right of the Contractor to receive or to be paid the balance due, or any part thereof.

The right is reserved by the Minister to reject the whole or any part of the work, should the said certificate be found to be inconsistent with the terms of the contract, or otherwise improperly given.

The Engineer's progress certificates, and the payment of progress estimates based upon the same, shall not be construed an acceptance or approval of the work, but only as temporary advances to the Contractor. The Contractor shall be bound, notwithstanding such progress estimates, to well and truly complete, finish and hand over in good condition, and to the entire satisfaction of the Engineer, by the time specified and in accordance with the terms and conditions of the specification, the whole of the work included herein, and all the percentage retained by the Minister shall be retained by him, until the said full and satisfactory completion has been formally certified by the Engineer. No moneys payable, due or accruing under this contract shall be assigned without the consent in writing of the Engineer.

44.0 ANNULMENT OF CONTRACT. In case the Contractor shall make default or delay in commencing, or in diligently executing any of the works or portions thereof to be performed, or that may be ordered under this contract, to the satisfaction of the Engineer, the Engineer may give written notice to the Contractor requiring him to put an end to such default or delay. Should such default or delay continue for six days after such notice shall have been given by the Engineer to the Contractor, or should the Contractor make default in the completion of the works, or any portion thereof, within the time limited with respect thereto in or under this contract, or should the Contractor become insolvent, or abandon the work, or make an assignment of this contract without the consent required, or otherwise fail to observe and perform any of the provisions of the contract, then in any of such cases, the Minister without any further authorization, may take all the work out of the Contractor's hands and may employ such means as he may see fit to complete the works. In such case the Contractor shall have no claim for any further payment in respect of work performed, but shall be chargeable with and shall remain liable for all loss and damage which may be suffered by reason of such default or delay, or the non-completion by the Contractor of the works. No objection or claim shall be raised or made by the Contractor by reason, or on account of the ultimate cost of the works so taken over, for any reason proving greater than, in the opinion of the Contractor, it should have been, and all materials, articles, and things whatsoever, and all machinery, tools, plant and equipment, and all rights, proprietary or otherwise, licenses, powers and privileges, whether relating to or effecting real estate or personal property, acquired, possessed or provided by the Contractor for the purposes of the work, or by the Engineer under the provisions of this contract shall remain and be the property of the Minister for all purposes incidental to the completion of the works, and may be used, exercised and enjoyed by the Minister as fully to all intents and purposes connected with the works as they might therefore have been used, exercised and enjoyed by the Contractor. The Minister may also at his option, sell or otherwise dispose of, at forced sale prices, or at public auction or private sale, or otherwise, the whole or any portion or number of such materials, articles, things, machinery, tools, plant and equipment at such price or prices as he may see fit, and retain the proceeds of any such sale or disposition and all other amounts then or thereafter due to the Contractor on account of, or in part satisfaction of any loss or damage which the Minister may or may have sustained by reason aforesaid.

45.0 OCCUPATIONAL HEALTH AND SAFETY ACT. It is mandatory on all Department contracts that the Contractor immediately report all incidents that have involved contact with electrical power lines, poles supporting electrical power lines, or other lines or poles that could impact electrical power lines to Nova Scotia Power Inc. and/or MTT as applicable and also the Department of Labour and the Department Supervisor for the project. If an accident occurs involving electrical power and/or communication lines, the Contractor shall appoint a representative to serve on a **Joint Use Accident/Incident Investigation** Committee.

It shall be the Contractor's responsibility to become familiar with the requirements of the current Occupational Health and Safety Act of Nova Scotia and shall conduct his work so as to conform to the Act.

Copies of the Occupational Health and Safety Act and the Regulations may be purchased through Service Nova Scotia and Municipal Relations, P O Box 637, Halifax, N. S. B3J 2T3
Phone No. 424-7580 or 1-800-526-6575
Internet or e-mail: www.gov.ns.ca. (Select link to Government Publications) or publications@gov.ns.ca

46.0 BLASTING

46.1 Blasting Near Watercourses. Blasting in or near watercourses shall receive approval from the Department of Fisheries and Oceans, and shall be in accordance with the "Guidelines for Use of Explosives in Canadian Fisheries Waters" (DFO; April 1993).

46.2 Occupational Health and Safety and Other Regulations. All blasting carried out on this project shall be in accordance with the Regulations made pursuant to the Occupational Health and Safety Act, Chapter 320 of the Revised Statutes of Nova Scotia. The requirements as set out in the Occupational Health and Safety Act are deemed to be minimum requirements and the Contractor shall conduct his operations in such a manner so as to comply with any and all other Act(s) or Regulations in effect at the time of blasting.

46.3 Claims for Damages. It shall be the responsibility of the Contractor to satisfy all claims for damages as a result of blasting.

46.4 Public Notification. The Contractor or his/her agent shall notify the general public through radio or news media that blasting will be taking place in a particular area and the anticipated duration of work should be specified.

46.5 Prerequisites Required Before Blasting Permitted. No blasting or use or storage of explosives shall be permitted on this project until the Contractor has provided proof of the following to the Engineer:

- That the blaster has a valid "Blaster's Certificate"
- That the Contractor has procured any blasting permit specific to the project required by any jurisdiction.
- That the Contractor has in effect, adequate insurance with reasonable deductible to cover any anticipated loss that may occur through claims or otherwise that may occur.
- That the Contractor has conducted a pre-blast survey of any structures in the area that may be affected by the blasting.

The Contractor shall provide a copy of the blast design to the Engineer, if requested to do so by the Engineer, before a particular blast is made.

46.6 Delays in Traffic / Damage to Pavement. The Contractor shall ensure that the amount of rock that may be blown onto the existing pavement is minimized and that the time of blasting is such to provide minimum delays to the travelling public. The Contractor shall have adequate and appropriate equipment available near the site of the blast to remove any rock that may be blown onto the roadway in such a manner to avoid damage to the pavement and, in a timely fashion, to minimize delays to traffic. The Contractor shall be responsible and satisfy all claims for damage to property of the Provincial Crown including, but not limited to, the roadway.

46.7 Compliance Monitoring. The Contractor shall retain a qualified consultant to monitor ground vibration and air shock waves of all blasts. The monitoring results shall be provided to the Engineer within 48 hours of the blast or sooner, if requested by the Engineer.

46.8 Magnitude of Blast. Blasting is to be done in a manner that all three components of ground vibrations shall not exceed 12.5 mm/sec (0.5 in./sec) and air concussion as measured by peak over pressure shall not exceed 0.003 lbs/sq.in. or 128 decibels as measured in the ground adjacent to the nearest structure and any other structure where it is anticipated the values will be higher than at the nearest structure.

46.9 Cost. All costs associated with blasting as described herein shall be considered incidental to the work involved with tender pay items such as, Solid Rock Excavation, Foundation Excavation Solid Rock, etc.

47.0 REGULATIONS AND GUIDELINES CONTAINED IN APPENDIX B. Regulations and guidelines contained in Appendix B are provided for information only. Procurement of the most current editions to these regulations and guidelines from the issuing authority is the responsibility of the Contractor. The Contractor shall conduct the work in accordance with said edition and/or the terms and conditions of the approvals granted by said authority. If there is a conflict, in the terms and conditions, between the approved guidelines and the actual permit, the more stringent conditions shall apply.

SECTION 2 - GRUBBING

1.0 DESCRIPTION

Grubbing shall consist of the removal and disposal of all stumps, roots, downed timber, embedded logs, humus, root mat and topsoil from areas of excavations and embankments or other areas as directed by the Engineer. Areas to be grubbed shall be indicated on the plans or designated by the Engineer.

2.0 REFERENCES

All reference standards shall be current issue or latest revision at the first date of tender advertisement. This specification refers to the following standards, specifications or publications:

- Division 7 Section 8, Topsoil
- Division 7 Section 11, Water Control at Culvert Extensions or Installations

3.0 SUBMISSIONS AND DESIGN REQUIREMENTS

4.0 MATERIALS

5.0 CONSTRUCTION METHODS

Grubbing shall be carried out by either of the procedures defined as Grubbing or Special Grubbing. Unless otherwise directed by the Engineer, grubbing shall not be required under embankments of 1.5 m or more. Generally, the areas to be grubbed shall extend to a width of 2 m outside of excavation and embankment slope lines. In no case shall any portion of the debris resulting from grubbing be placed in or under embankments or along the top of excavations. Push-offs shall not be permitted.

For areas where the Engineer has specified that topsoil is to be salvaged refer to Division 7 Section 8 of these specifications.

Areas used for the disposal of material removed in the grubbing operation shall not obstruct, contaminate or cause siltation of any streams or impair the drainage of the area and shall be left in a condition satisfactory to the Engineer.

Grubbing of areas for the installation of drainage structures shall be as detailed in Division 7 Section 11 of these specifications.

5.1 Grubbing. Material resulting from the grubbing operation may be loaded and transported to a disposal area outside the right-of-way. The disposal area shall be supplied by the Contractor and approved by the Engineer. If approved by the Engineer, the debris resulting from grubbing may be buried in pits beyond the toe of slope. No stumps, roots, embedded logs or other objectionable material shall be used to dress slopes.

5.2 Special Grubbing. Special Grubbing shall be carried out only on cultivated land or other barren land where no clearing is required. The Contractor shall provide areas for the disposal of the excavated material. The disposal areas shall be approved by the Engineer.

The Contractor shall haul the excavated material resulting from the Special Grubbing operation up to the free haul limit of 300 m to place this material within the right-of-way if so directed by the Engineer.

Material resulting from the grubbing operation shall not be disposed of by windrowing within the right-of-way boundary.

If approved by the Engineer the excavated material resulting from Special Grubbing may be used to flatten the embankment slopes after the theoretical slope has been achieved.

6.0 QUALITY CONTROL / QUALITY ASSURANCE

7.0 METHOD OF MEASUREMENT

The quantity of Grubbing and Special Grubbing to be paid for under this section shall be the number of hectares grubbed determined by horizontal measurement.

8.0 BASIS OF PAYMENT

Grubbing and Special Grubbing will be paid for at the appropriate contract unit price per hectare. The unit bid price shall be full compensation for grubbing the areas designated by the Engineer. Topsoil and other excavated material removed in the grubbing operation shall be paid for as Roadway and Drainage Excavation Common. The Contractor shall supply all equipment, plant, labour, tools, and incidentals necessary to complete the work.

Material resulting from Grubbing or Special Grubbing shall be transported to the disposal area at no extra cost to the Department.

The Contractor will not be paid overhaul for transportation of material resulting from the Grubbing or Special Grubbing operation where the material is transported to a disposal area provided by the Contractor whether inside or outside the right-of-way boundary.

The Contractor will be paid for overhaul, at the overhaul rates listed in Appendix C, where material resulting from the Special Grubbing operation is hauled over 600 m and placed within the right-of-way as directed by the Engineer.

9.0 WARRANTY

SECTION 3 - ROADWAY AND DRAINAGE EXCAVATION

1.0 DESCRIPTION

Roadway and Drainage Excavation shall consist of excavating, transporting or disposing of all materials taken from within the limits of the work except Borrow and other excavation not included in this specification. The work shall include all excavation necessary to construct or alter side ditches, offtake ditches, catchwater ditches and inlet or outlet ditches to drainage structures. The work shall also include the sloping and shaping necessary to prepare, alter, construct and complete embankments, shoulders, gutters, ditches, roadway and driveway intersections to the required alignment, grade and typical cross-sections shown as on the Plans or as directed by the Engineer.

2.0 REFERENCES

All reference standards shall be current issue or latest revision at the first date of tender advertisement. This specification refers to the following standards, specifications or publications:

- Division 2 Section 5, Borrow
- Division 2 Section 4, Disposal of Surplus Material
- Drawing HS201.DWG
- Drawing HS202.DWG

3.0 SUBMISSIONS AND DESIGN REQUIREMENTS

4.0 MATERIALS

5.0 CONSTRUCTION METHODS

5.1 General. All suitable materials removed from the excavation shall be used as far as practicable in the construction of embankments as directed by the Engineer. All breakage and slides shall be removed by the Contractor and disposed of as directed. Ditches and waterways shall be excavated to the depth, width and grade as shown on the plans or as directed by the Engineer. No excavated material shall be wasted without the approval of the Engineer. When material is to be wasted it shall be disposed of as approved by the Engineer. During construction the ditches shall be maintained in such condition that the roadway will be well drained at all times.

5.2 Solid Rock Excavation. Solid Rock excavation shall consist of excavating and removing rock insitu and all Boulders measuring 1 m^3 or greater in volume. Subsurface boulders 1 m^3 or greater in volume are classified as Solid Rock and this quantity shall be deducted from the Common Excavation quantity.

Within the limits of the area to be surfaced, Solid Rock excavation shall extend to 600 mm below the subgrade elevation shown on the Plans or as directed by the Engineer. No undrained pockets shall be left in the rock surface. A material satisfactory to the Engineer shall be used to backfill the roadway to the subgrade elevation. All loose or shattered fragments of rock shall be removed from the roadway slopes. Excavated rock or waste from the excavation shall not be left outside the tops of the roadway slopes. Where depth permits, Solid Rock Excavation shall be used to construct embankments, otherwise it shall be disposed of as approved by the Engineer.

5.3 Swamp Excavation. Swamp Excavation shall consist of the excavation and disposal of peat, black muck or humus encountered in swamp or marsh areas.

If approved by the Engineer, excavated swamp material may be disposed of within the right-of-way. Such material shall be trimmed and left in a neat condition to the approval of the Engineer. Backfill on the areas from which Swamp Excavation has been carried out shall consist of approved material, and such backfilling shall follow excavation operations as directed by the Engineer.

It shall be the responsibility of the Contractor to ensure that the full depth of swamp is removed. Test drilling may be carried out on fills where swamps have been removed and backfilled. Where drilling shows swamp material exists in or under the fill, the Contractor, at their own expense, shall remove all such materials to acceptable bottom and shall backfill the area with acceptable material.

5.4 Common Excavation. All excavated material other than Solid Rock or Swamp Excavation shall be classed as Common Excavation.

6.0 QUALITY CONTROL / QUALITY ASSURANCE

7.0 METHOD OF MEASUREMENT

7.1 General. The quantity to be paid for under this item shall be the number of cubic metres of excavated material as shown on the cross-section sheets between the original ground line, as cross-sectioned before grubbing operations have started, and the lines of the completed and accepted excavation as computed by the average end area method of computation.

In rock excavations, no payment will be made for material excavated beyond a defined plane outside the theoretical slopes except as detailed in Division 2 Section 5 of these specifications. The theoretical slopes shall be as indicated on the plans or as directed by the Engineer. The defined plane referred to shall be parallel to and 1 m (measured horizontally) from the theoretical slope.

In common excavations, no payment will be made for material excavated beyond a defined plane outside the theoretical slopes except as detailed in Division 2 Section 5 of these specifications. The theoretical slopes shall be as indicated on the plans or as directed by the Engineer. The defined plane referred to shall be parallel to and 0.5 m (measured horizontally) from the theoretical slope.

7.2 Rock. Whenever Solid Rock is encountered the Contractor shall strip the area of earth within the slopes and notify the Engineer in order that proper measurements or cross-sections may be made. No allowance will be made for Solid Rock excavated before such measurements or cross-sections have been made.

7.3 Swamp Excavation. The depth of Swamp Excavation shall be determined either by soundings taken before the swamp is excavated or by cross-sections taken after the swamp material is removed. All swamp material shall be removed from beneath the roadway embankment. The outer limit of the Swamp Excavation shall be as directed by the Engineer and shall be bounded by:

- lines extending vertically to the bottom of the swamp from the point where the theoretical slope line meets the top of the swamp, or
- lines extending vertically to the top of the swamp from the point where the theoretical slope line meets the bottom of the swamp, as shown on drawings HS201 and HS202.

7.4 Other Common Excavation. On paving, repaving and upgrading contracts the quantities excavated shall be computed by the average end area method. The area to be used for the computations shall be the greater of:

- the area shown on the cross-section sheets between the original position of the ground line before the ditching operation started and the lines of the completed and accepted excavation.
- an area determined by the width of the excavation measured horizontally on the cross-section at grade level by 300 mm in depth.

8.0 BASIS OF PAYMENT

8.1 General. Roadway and Drainage Excavation will be paid for under one of the following three classes:

- Solid Rock Excavation
- Swamp Excavation
- Common Excavation

The volume of Roadway and Drainage Excavation measured as provided above will be paid for at the contract unit price bid for Solid Rock Excavation, Swamp Excavation or Common Excavation, as the case may be, which prices shall be full compensation for the excavation, hauling (exclusive of overhaul), the formation of embankments (exclusive of compaction), trimming of slopes, disposal of surplus and waste materials, preparation and completion of subgrade, shoulders and roadway, and the furnishing of all equipment, tools, labour and incidentals necessary to complete the work, except the displacement of swamp by blasting which will be paid for as Extra Work.

8.2 Overhaul General. This item shall include the transportation of "Roadway and Drainage Excavation" to embankment sites or other selected points over distances exceeding and exclusive of the established free haul distance of 300 m. All costs up to the free haul distance shall be included in the contract unit price per cubic metre for the class of excavation involved.

Material taken from excavation and used in embankments and selected material, hauled a distance greater than 300 m, when so directed by the Engineer, shall be paid for at the Standard Overhaul Rates for excavation.

8.2.1 Designated Overhaul. It may be necessary to move selected "Roadway and Drainage Excavation" from a designated area to a designated embankment or other site as directed by the Engineer. In this instance overhaul beyond the 300 m free haul distance will be computed separately from cross sections taken before and after placement of the material. No allowance will be made for selected material moved before cross sections have been made.

Haul

300 - 599 m	600 - 899 m
900 - 1199 m	1200 - 1499 m
1500 - 1799 m	1800 - 3199 m
3200 - 4799 m	4800 - 6399 m

8.2.2 Ordinary Overhaul. After proper deduction has been made for material placed within the free haul distance and selected material if any, the quantity of embankment excavation placed beyond the free haul distance of 300 m shall be classified as overhaul and calculated by the Mass Diagram Method. These distances shall be measured along the centre-line of the main roadway which is under construction and any additional haul due to circuity of travel will not be considered.

9.0 WARRANTY

SECTION 5 - BORROW

1.0 DESCRIPTION

Borrow is the additional material required for embankment construction when there is insufficient useable material available from the excavation. Borrow shall consist of useable material and shall be secured outside or inside of the highway right-of-way as approved by the Engineer.

2.0 REFERENCES

All reference standards shall be current issue or latest revision at the first date of tender advertisement. This specification refers to the following standards, specifications or publications:
- Division 2 Section 1, Clearing
- Division 2 Section 2, Grubbing

3.0 SUBMISSIONS AND DESIGN REQUIREMENTS

The Contractor shall notify the Engineer of all proposed sources of Borrow. The Contractor shall have received approval from the Engineer prior to using material from these sources.

4.0 MATERIALS

5.0 CONSTRUCTION METHODS

The lands and right-of-way required for all Borrow obtained outside the limits of the highway shall be furnished by the Contractor. The Borrow pits shall be cleared and grubbed at the Contractor's expense to the approval of the Engineer. Borrow pits shall be excavated to regular lines to permit accurate measurement. Borrow pits shall be left in a neat condition with uniform slopes and the area within the slopes suitably graded and drained to the approval of the Engineer.

5.1 Side Borrow. Side Borrow may be taken by the Contractor from areas immediately outside the theoretical roadway slopes in excavations only with the prior approval of the Engineer. Where such Side Borrow is taken the outer slopes shall be finished parallel to those specified for the outer slopes of the roadway or as approved by the Engineer. The Department will allow the Contractor to obtain suitable Side Borrow from within the limits of the highway right-of-way without charge. Clearing and grubbing within the highway right of way shall be as detailed in Division 2, Section 1 and Section 2, except that no payment will be made for clearing and grubbing of areas where Side Borrow is taken.

6.0 QUALITY CONTROL / QUALITY ASSURANCE

7.0 METHOD OF MEASUREMENT

7.1 Borrow Pits. The quantity to be paid for under this section shall be the number of cubic metres of excavated Borrow material, as shown on the cross-sections, between the lines of the grubbed ground and the lines of the completed Borrow excavation. The volume of unusable boulders in Borrow pits shall be deducted from the volume of Borrow to be paid. Computation shall be by the average end area method. The Contractor shall notify the Engineer sufficiently in advance of Borrow removal to permit the measurement of the Borrow pit area. Any material removed from Borrow pits before such measurements have been made will not be paid for. If the Contractor excavates or places more Borrow material than is required, the quantity of material excavated in excess of the quantity required, shall be deducted from the amount of Borrow measured.

7.2 Side Borrow

7.2.1 Side Borrow Approved Prior to Road Cut. In areas where the Department has approved the acquisition of Side Borrow before the roadway excavation has begun, material removed beyond the theoretical slope shall be considered Side Borrow.

7.2.3. Material Removed From the 0.5 m Overcut Plane. In areas where the Department has not approved the acquisition of Side Borrow but some material was inadvertently removed beyond a plane parallel to and measured 0.5 m horizontally from the theoretical slope, and where the Department has benefited from the use of this material beyond the plane, then material removed beyond the plane will be considered Side Borrow. This would not apply in the case where the Contractor was advised before the material was removed that it would not be considered Side Borrow.

7.2.3 Side Borrow Approved After Road Cut. In areas where the Department approves the acquisition of Side Borrow after removal of roadway excavation beyond the theoretical slope has begun, material removed beyond the actual excavation completed at the time of approval (but in no case inside the theoretical side slope) will be considered Side Borrow.

8.0 BASIS OF PAYMENT

The volume measured as detailed above will be paid for at the contract unit price bid per cubic metre of Borrow, which price shall be full compensation for the clearing, grubbing, excavating, placing, site reclamation and the furnishing of all materials, equipment, labour, and incidentals necessary to complete the work. No classification other than Borrow shall be allowed and only material placed in the work will be paid for.

9.0 WARRANTY

SECTION 12 - FOUNDATION EXCAVATION

1.0 DESCRIPTION

Foundation Excavation shall consist of the removal of material for the construction of culverts, farm crossings and the laying of pipe, catch basins and retaining walls.

2.0 REFERENCES

All reference standards shall be current issue or latest revision at the first date of tender advertisement. This specification refers to the following standards, specifications or publications:
- Division 2 Section 4, Disposal of Surplus Material
- Drawing HS203.DWG
- Drawing HS528.DWG

3.0 SUBMISSIONS AND DESIGN REQUIREMENTS

4.0 MATERIALS

5.0 CONSTRUCTION METHODS

Foundation Excavation shall conform to the lines and grades shown on the plans or as directed by the Engineer.

Boulders measuring 0.25 m^3 or greater, all rock insitu and masonry of old structures shall be classed as Foundation Excavation Solid Rock. All other excavated materials shall be classed as Foundation Excavation Common. The materials, so removed, shall be satisfactorily utilized or disposed of as directed by the Engineer.

After the excavation has been completed the Contractor shall notify the Engineer and no bedding material, masonry, pipe or other material shall be placed in the excavated area until the Engineer has approved the lines and grades of the excavation and character of the foundation material.

Where any structure including farm crossings, driveway culverts and roadway culverts etc., are to be installed and when sufficient excavation has been carried out during grading operations, Foundation Excavation will not be allowed but the excavation will be classified as Roadway and Drainage Excavation. If additional excavation is required for installing any structure including farm crossings, driveway culverts and roadway culverts, etc., this additional excavation shall be classified as Foundation Excavation.

6.0 QUALITY CONTROL / QUALITY ASSURANCE

7.0 METHOD OF MEASUREMENT

All excavated material shall be measured in cubic metres in its original position provided such material has been satisfactorily utilized or disposed of as directed. The maximum limits for foundation excavation shall be as detailed in drawings HS203.DWG and HS528.DWG or as directed by the Engineer.

Measurement shall be based on the actual excavation carried out within the specified limits.

8.0 BASIS OF PAYMENT

The volume of Foundation Excavation measured as provided above will be paid for at the contract unit price bid per cubic metre for Foundation Excavation Common or Foundation Excavation Solid Rock, as the case may be. The volume of subsurface boulders paid as Foundation Excavation Solid Rock shall be deducted from the volume paid as Foundation Excavation Common. Payment shall be full compensation for the work described in this section, including all equipment, materials, labour, and incidentals necessary to complete the work.

9.0 WARRANTY

SECTION 2 - GRAVEL TYPE 1, 1S, 2 & M

1.0 DESCRIPTION

Gravel Type 1, Type 1S, Type 2 and Type M shall be composed of crushed and screened rock or gravel. The material shall be transported and placed upon the subgrade, subbase or shoulder and compacted as directed and in accordance with these specifications.

2.0 REFERENCES

All reference standards shall be current issue or latest revision at the first date of tender advertisement. This specification refers to the following standards, specifications or publications:

- ASTM C 117, Test Method for Material Finer Than 75 µm Sieve in Mineral Aggregate by Washing
- ASTM C 127, Test Method for Specific Gravity and Absorption of Coarse Aggregate
- ASTM C 136, Test Method for Sieve Analysis of Fine and Coarse Aggregate
- ASTM D 4318, Test Method for Liquid Limit, Plastic Limit and Plasticity Index of Soils
- TPW TM-1, Test Method for the Resistance of Coarse Aggregate to Degradation in the Micro-Deval Apparatus
- TPW TM-3, Test Method for the Determination of Percent Fractured Particles in Processed Coarse Aggregate
- Division 1 Section 4, General Provisions
- Division 3 Section 5, Compaction of Gravels

3.0 SUBMISSIONS AND DESIGN REQUIREMENTS

4.0 MATERIALS

Gravel shall be composed of approved hard, durable stones and sand particles in conformance with this specification.

4.1 Gradation Requirements. The gravels shall be free from flat, elongated or other objectionable pieces and shall be approved by the Engineer prior to utilization. The gravels shall be tested in accordance with ASTM C 117 and C 136 and shall fulfil the gradation requirements detailed in Table 3.2.1.

Table 3.2.1 - Gradation

Sieve Size, µm	Percent Passing			
	Type 1	Type 1S	Type 2	Type M
80 000			100	
56 000			70 - 100	
28 000			50 - 80	100
20 000	100	100		85 - 100
14 000	50 - 85	50 - 85	35 - 65	70 - 95
5 000	20 - 50	30 - 55	20 - 50	30 - 60
1 250				15 - 35
160	5 - 12	7 - 20	5 - 12	5 - 12
80	3 - 8(1)	5 - 12(2)	0 - 7(1)	3 - 8

(1) For gravel sources not classified as quarries the allowable percentage passing the 80 µm sieve shall be 3 to 5%.

(2) Where percentages passing the 5000 µm sieve are between 30 and 45%, the allowable percentage passing the 80 µm sieve shall be 3 to 12%.

4.2 Fractured Particles Content. The gravel shall have a fractured particle content conforming to values listed in Table 3.2.2. The fractured particle shall have at least one well defined fresh face resulting from fracture, with the face comprising no less than 20% of the particle surface area. Particles with smooth faces and rounded edges, or with only small chips removed, are not considered fractured.

Table 3.2.2 - Fractured Particles

Gravel	Fractured Particles, one face, % min.	Test Method
Type 1(1)	80	TPW
Type 1(2)	50	TPW
Type 2 and 1S	50	TPW
Type M	40	TPW

[1] For highways with truck (FHWA Class 4 or above) traffic equal to or greater than 200 per day.

[2] For highways with less than 200 trucks (FHWA Class 4 or above) per day.

4.3 Physical Properties. Gravel materials shall conform to the physical properties listed in Table 3.2.3.

Table 3.2.3 - Physical Properties

Property	Test Method	Type 1	Type 1S	Type 2	Type M
Absorption % max.	ASTM C 127	1.75	1.75	1.75	2.00
LA Abrasion % max.	ASTM C 131	40	40	40	40
Plasticity Index max.	ASTM D 4318	0	0	0	3
Micro-Deval % max.	TPW	20	35	20	30

5.0 CONSTRUCTION METHODS

Crushing, screening and transporting of materials shall be performed by such methods so that a uniform grade of material shall be placed on the roadbed. Screening shall be done with vibrating or rotary screens to eliminate all objectionable material such as earth, sod, foreign vegetable matter, clay or any excess of silt in the gravel. Prior to the placement of Gravel Type 2 or Type 1, the existing subgrade or subbase shall be shaped to the required cross-section to the approval of the Engineer.

Gravels Type 1, Type 1S and Type 2 shall be compacted as specified in Division 3 Section 5 and shall be shaped with a blade grader while being compacted. The shaping of the material shall be continued until it is well compacted, free from ruts, waves and undulations. The final authorized cross-section shall conform to the established grades within a tolerance of ± 25 mm for Gravel Type 2 and ± 10 mm for Gravel Type 1 but not uniformly high or low.

Gravel Type M is intended for use by maintenance personnel as a surface course or general maintenance material.

Stockpiles shall be built in layers not to exceed 1 m in depth. Each layer shall be completed before beginning the next layer. Aggregates delivered to the stockpile in trucks shall be uniformly spot-dumped and the stockpile built as specified above. Coning of stockpiles shall not be permitted.

5.1 Inspection. The Department will have a representative at the site of gravel production. The Contractor is responsible to provide free and safe access to the site to permit the Department's representative to carried out required duties.

The Contractor shall supply an inspection facility at the gravel production site for the Department's representative and at the Contractor's expense. The location of this facility shall be close to the production site which allows a clear view of the operation and shall be in an environmentally acceptable area. At the gravel production site, a reservoir of 100 L. of water suitable for performing tests shall be supplied.

5.1.1 Inspection Quarters - Aggregate Production Facility.

- outside dimension 2 m x 2 m minimum
- one door
- one window
- one bench
- one chair
- supply of water for testing purposes
- source of heat and/or light (if required)

6.0 QUALITY CONTROL / QUALITY ASSURANCE

7.0 METHOD OF MEASUREMENT

The Contractor shall, at their own expense, provide, install and maintain such approved scales and all suitable facilities as detailed in Division 1 Section 4 Subsection 38.

The quantity of Gravels Type 1, Type 1S, Type 2 and Type M placed in stockpile as indicated above, will be estimated by the Engineer.

8.0 BASIS OF PAYMENT

Gravels Type 1, Type 1S, Type 2 and Type M will be paid for at the contract unit price per tonne for Gravels. The price shall be full compensation for furnishing all materials, equipment, and labour required to carry out the handling, hauling, placing and compacting of the Gravels as well as any incidentals necessary to complete the work.

Gravels Type 1, Type 1S, Type 2 and Type M placed in stockpile as indicated above will be paid for at the current rate as indicated in Appendix C.

When such materials in stockpile have been placed on the highway the Contractor shall be paid at the unit price bid for such materials and the payments for suchmaterials in stockpile shall be deducted and shown as a minus quantity on the estimate sheet. Any gravel left in stockpile and not used on the highway will not be paid for and shall remain the property of the Contractor.

The Contractor may be paid for gravels in stockpile when such materials cannot be placed on the highway within a period of two months from the date of commencement of crushing such material.

9.0 WARRANTY

SECTION 2 - PERFORMANCE GRADED ASPHALT BINDER (PGAB)

1.0 DESCRIPTION

This item shall include the supply and transportation of various grades of Performance Graded Asphalt Binder (PGAB) to the Contractor's plant that is used in the manufacture of asphalt concrete and is accepted in place.

Performance Graded Asphalt Binder (PGAB): means an asphalt binder which is an asphalt-based cement that is produced from petroleum residue either with or without the addition of non-particulate organic modifiers.

Quality Control (QC) and Quality Assurance (QA) procedures are described herein. The Contractor shall be responsible to submit the QC test results and to ensure that all materials meet specification.

Initial acceptance of PGAB shall be based on samples taken and tested by the supplier's designated laboratory, subject to the conditions detailed in this specification.

To determine final acceptance of the product, the Department will conduct QA testing to confirm test results supplied by the Contractor by testing random samples taken from the Contractors' binder storage tank(s) located at the hot mix plant.

2.0 REFERENCES

All reference standards shall be current issue or latest revision at the first date of tender advertisement. This specification refers to the following standards, specifications or publications:

- AASHTO MP1, Standard Specification for Performance Graded Asphalt Binder
- AASHTO PP6, Standard Practice for Grading or Verifying the Performance Grade of an Asphalt Binder
- ASTM D 140, Practice for Sampling Bituminous Materials
- ASTM D 3665, Standard Practice for Random Sampling of Construction Materials

3.0 SUBMISSIONS AND DESIGN REQUIREMENTS

3.1 Notice of Supply. Bidders shall nominate their source of PGAB and provide a Statement of Supplier's price for PGAB as a supplement to the tender. On the form "Statement of PGAB, Liquid Asphalt-Primer and Emulsified Asphalt-Tack", Bidders shall:

- Submit with their tender a statement as to the source of PGAB. The Bidder shall only nominate one source of supply of PGAB. The Supplier must be on the Department's list of approved supplier's.
- Indicate the Supplier's Posted Rack Price for PGAB FOB refinery (excluding taxes). For confirmation, the Bidder shall attach the written price quotation from the Supplier, which price shall be effective at time of award of contract and shall remain in effect until the end of the current calendar year.

No tender shall be considered that does not include the above information.

3.2 Contracts Completed in Calendar Year. In the event that the Contractor wishes to change the source of supply during the progress of the contract, the Contractor shall apply for approval, in writing, to the District Director. Approval in writing must be given by the District Director before the source of supply is changed.

The Contractor shall not be compensated for any increase in the cost of PGAB in the calendar year in which the asphalt work was initially intended to be done.

3.3 Contracts Carried Over To The Next Calendar Year. In the event the Supplier's Posted Rack Price increases or decreases subsequent to the end of the calendar year in which the asphalt work was initially scheduled and one of the following conditions is satisfied, then a price increase or decrease will be considered:

- In the opinion of the Department, a delay caused by another Contractor working on the contract site adversely affects the start-up date of the Contract resulting in the completion of paving being delayed until the following year; or
- In the opinion of the Department, the lateness in tender call makes it unreasonable for the Contractor to finish asphalt work that year. This will be noted in the Special Provisions of the contract; or
- In the opinion of the Department, for reason(s) beyond the control of the Contractor, the work could not be completed before the end of the calendar year in which the work was initially intended to be completed.

If the request for a price increase or decrease is approved by the District Director the Contractor will be assessed an increase or decrease for an amount equal to the actual dollar difference between the Supplier's original Posted Rack Price quotation and the Supplier's new Posted Rack Price for PGAB. In all cases the Supplier's Posted Rack Price quotation for the price of PGAB for the next calendar year shall be submitted to the Engineer before the Contractor will be paid for any PGAB used that year. Any claim for a price difference by the Contractor shall be supported by the Supplier's invoice.

4.0 MATERIALS

4.1 Physical Requirements. The PGAB as outlined in Table 4.1.1 shall conform (**with or without liquid anti-stripping additive,** or other approved additives) to the requirements of AASHTO Provisional Standard MP1 for the performance grade specified in the Contract when tested using the methods designated in AASHTO Provisional Standard PP6.

4.2 General Requirements. The PGAB shall be homogeneous, free of water and any contamination and shall not foam when heated to the temperatures specified by the manufacturer for the safe handling and use of the product.

4.3 Approved Suppliers. PGAB shall be obtained from a Supplier approved by the Department. Approved Suppliers will be identified in the Contract Special Provisions.

5.0 CONSTRUCTION METHODS

5.1 Tankers, Storage Tanks. Tankers used to transport PGAB and PGAB storage tanks located at asphalt concrete mixing plants shall meet the following requirements:

- Be free from hydrocarbon fuels or solvents, such as gasoline, diesel, varsol, gasoline, etc.
- Have a sampling spigot as outlined in ASTM D 140.
- Be equipped with thermometers, accurate and capable of reading to the nearest 2°C.

6.0 QUALITY CONTROL / QUALITY ASSURANCE

6.1 PGAB Documentation. For each grade of PGAB specified in the Contract, the Contractor shall supply the current test result data to the Project Engineer prior to the first use of the product(s). The product shall have been graded by conducting the required tests of the "Test Procedure for Verifying the Nominal Grade of an Asphalt Binder" of AASHTO Provisional Standard PP6, Section 7.

The Contractor shall provide the applicable mixing and laboratory compaction temperatures for each product, and documentation of construction, storage and handling requirements, including the material safety data sheet, laboratory recompaction temperature, mix discharge temperature and recommended extraction procedure.

6.2 Laboratory Proficiency. The laboratory conducting the QC testing shall have participated in the most recent AASHTO proficiency sample correlation program for PGAB, and shall have obtained proficiency ratings in the program satisfactory to the Department. Alternatively, the laboratory shall have satisfactorily participated in any equivalent correlation program acceptable to the Department. Documentation of the laboratory's participation and proficiency shall be provided to the Department upon request.

6.3 Anti-Stripping Additive. When a liquid anti-stripping agent is to be incorporated into the mix, samples of PGAB for QC or QA are to be taken after the anti-stripping agent has been added to the PGAB.

6.4 Samples for Testing. All QA samples shall be a minimum size of one litre and shall be taken from the Contractor's storage tank in accordance with ASTM D 140 by the Contractor. An additional set-aside sample shall be taken by the Contractor in the event an appeal test is required. The random number information pertaining to the hot mix tonnage at which the PGAB is required to be sampled shall be supplied by the Department.

The Department will verify the sampling, package and transport all samples (including set-aside samples) for QA testing.

7.0 QUALITY CONTROL

7.1 Quality Control Plan. The Contractor shall provide a QC Plan to the Project Engineer detailing the quality control activities related to the use of PGAB. A supplier's QC Plan may be used for this purpose, provided that specific storage/handling details, etc. are furnished by the Contractor. The QC Plan shall be submitted within seven calendar days prior to the first use of the product(s). Hot mix production shall not commence until the QC Plan is accepted by to the Department.

As a minimum, the QC Plan shall provide the following information:

- The type of facility from which the product(s) will be supplied (refinery, terminal) and its location.
- The method and frequency for initial testing, specification compliance testing and any other testing

employed to either guide the manufacturing process of the PGAB or to ensure the on-going compliance of the product(s) to Table 4.1.1.

- If specification compliance testing is carried out prior to shipping the product(s) from the supplier's facility to the hot mix plant, the QC Plan shall provide an outline of the procedures to be followed for checking transport vehicles before loading to prevent contamination of shipments.
- The QC Plan shall provide an outline of procedures detailing how anti-strip additives will be incorporated in the product(s) and how anti-strip additive products and dosage rates will be identified on shipping documentation. Tests employed to ensure compliance of the product(s) to Table 4.1.1 after anti-strip additives are incorporated in the product(s) shall be identified.
- The QC Plan shall identify the QC laboratory and detail control charting or any such statistical procedures which will be used to track the quality of the product(s).
- The QC Plan shall detail the methods to be used to identify and provide for the exclusion of materials which do not conform to specifications, prior to incorporating into the hot mix. The QC Plan shall also detail how such materials will be identified and dealt with in the event that they are inadvertently incorporated into the hot mix. The QC Plan shall detail how such occurrences will be documented, and the methods of disposition of such materials.

8.0 PRODUCT ACCEPTANCE

8.1 Basis of Initial Acceptance. Initial acceptance of PGAB will be based on QC test results submitted by the Contractor, subject to the conditions specified herein. The Contractor shall be responsible to submit the supplier's QC test result data and to ensure that all materials meet specification. The supplied product shall meet all the requirements of AASHTO Provisional Standard MP1 when the product is tested in accordance with the methods of AASHTO Provisional Standard PP6, Section 7, "Test Procedure for Verifying the Nominal Grade of an Asphalt Binder".

For initial acceptance purposes, a minimum of one complete MP1 compliance test shall be performed for each Supplier batch of PGAB.

8.2 Lot Sizes. Lot sizes for PGAB shall be based on the total tender quantity of asphalt concrete hot mix for each unique grade of PGAB. A Lot shall be terminated when the source of the PGAB is changed.

8.3 Quality Assurance. QA testing will be carried out by the Department for the purposes of ensuring that the materials used in the work conform to the quality requirements of Table 4.1.1. The entire tender quantity of asphalt concrete hot mix shall be considered one lot with QA sub-lot sampling and testing as follows:

Tonnes of Hot Mix	QA Sample Frequency
0 - 500	1
5 000 - 10 000	1
each additional 5 000	1

If a QA test result for any sample indicates non-compliance with the specification, the Department will advise the Contractor of the test result and may conduct classification testing. The additional testing will determine the actual performance high and low temperatures of the sample(s), rounded to the nearest 0.5 degrees Celsius.

Test results for sub-lots which do not comply with the performance grading requirements shall be categorized based on individual deviations from the design maximum or minimum temperature defined as follows. Price adjustments, where applicable, will be expressed as a percentage of the Contractor's unit bid price for the hot mix within the given sub-lot.

Temperature Deviation *	Payment	Price Adjustment (% of Mix Price)
≤3°C	Full	N/A
>3 & ≤6°C	Reduced	5 %
>6 & ≤9°C	Reduced	10 %
>9 & ≤12°C	Reduced	20 %

* **Note:** Actual performance gradings which are either higher than the maximum or lower than the minimum design temperature will be accepted at full price.

8.4 Disposition of Reduced/Rejected Lots. The Department will review the test results and determine the disposition of the mix constructed using any PGAB product which does not conform to Table 4.1.1. Hot mix constructed using PGAB for which test results indicate that the product did not conform to specification will be dealt with as follows:

Price Reductions: As per the above table.

Rejection: The Department reserves the right to reject all asphalt concrete mix produced with PGAB sub-lot temperature deviations exceeding 12 degrees Celsius.

Rejected sub-lots shall be removed and replaced at the Contractor's expense.

The full thickness of the appropriate lift of pavement shall be removed by cold milling. The asphalt concrete mix used to replace the rejected pavement shall meet the same requirements as those originally specified. Repair areas will be retested for acceptance with the cost of retesting to be borne by the Contractor.

9.0 APPEAL TESTING

The Contractor shall serve notice of appeal to the Project Engineer, in writing, within 48 hours of receipt of the QA test results. Appeal re-testing may be carried out on set-aside samples only if the cost of the impact of non-compliance, as determined by the Project Engineer, exceeds the cost of re-testing.

The Contractor may have a representative present during testing at the Department's QA facility. During the period of testing, the Contractor's representative shall comment on anything concerning the testing which he/she does not consider to be valid and the Project Engineer shall respond to all comments in order to resolve them.

The appeal testing will determine the actual performance high and low temperatures, rounded to the nearest 0.5 degrees Celsius, of the PGAB and the outcome is binding on the Department and the Contractor.

The cost of the appeal testing, including sample delivery, shall be borne by the Contractor unless the testing confirms total conformance of the material sample to contract specifications, in which case the cost will be borne by the Department.

10.0 METHOD OF MEASUREMENT

The quantity of PGAB to be paid for under this section shall be calculated on the basis of the PGAB delivered to the plant. The Department will not reimburse the Contractor for PGAB that is used in private work or any that is wasted as calculated on the weekly asphalt report. Adjustments will be made for initial and final tank measurements corrected to 15°C.

Plants that produce a large percentage of asphalt concrete for private work, such as in the Halifax-Dartmouth area and the Sydney area, will be paid for supply and transportation as calculated by the Field Adjusted Mix Design. The tonnages thus calculated will be payable to the Contractor.

11.0 BASIS OF PAYMENT

The supply and transportation of PGAB will be paid for at the contract unit price per tonne of PGAB. This price shall be compensation for any and all expenses that may be incurred in the supply, transport and delivery of the PGAB to the Contractor's plant.

12.0 WARRANTY

Table 4.1.1 - Performance Graded Asphalt Binder Specification

Performance Grade	PG-52							PG-58					PG-64					
	-10	-16	-22	-28	-34	-40	-46	-16	-22	-28	-34	-40	-10	-16	-22	-28	-34	-40
Average 7-day Maximum Pavement Design Temperature, °C[a]	<52							<58					<64					
Minimum Pavement Design Temperature, °C[a]	>10	>16	>22	>28	>34	>40	>46	>16	>22	>28	>34	>40	>10	>16	>22	>28	>34	>40
Original Binder																		
Flash Point Temp, T48: Minimum °C	230																	
Viscosity, ASTM D 4402 [b] Maximum, 3 Pa s (3000cP), Test Temp, °C	135																	
Dynamic Shear, TP5[c] G*/sinδ[g], Minimum, 1.00 kPa Test temperature @ 10 rad/s, °C	52							58					64					
Rolling Thin Film Oven (T 240) or Thin Film Oven (T 179) Residue																		
Mass Loss, Maximum, %	1.00																	
Dynamic Shear, TP5: G*/sinδ[g], Minimum, 2.20 kPa Test temperature @ 10 rad/s, °C	52							58					64					
Pressure Aging Vessel Residue (PP1)																		
PAV Aging Temperature, °C[d]	90							100					100					
Dynamic Shear, TP5: G*sinδ[g], Maximum, 5000 kPa Test temperature @ 10 rad/s, °C	25	22	19	16	13	10	7	25	22	19	16	13	31	28	25	22	19	16
Physical Hardening[e]	Report																	
Creep Stiffness, TP1:[f] S, Maximum, 300 MPa m-value, Minimum, 0.300 Test Temp, @ 60s, °C	0	-6	-12	-18	-24	-30	-36	-6	-12	-18	-24	-30	0	-6	-12	-18	-24	-30
Direct Tension, TP3:[f] Failure Strain, Minimum, 1.0% Test Temp @ 1.0 mm/min, °C	0	-6	-12	-18	-24	-30	-36	-6	-12	-18	-24	-30	-0	-6	-12	-18	-24	-30

a. Pavement temperatures are estimated from air temperatures using an algorithm contained in the LTPP Bind program, may be provided by the specifying agency, or by following the procedures as outlined in MP2 and PP28.

b. This requirement may be waived at the discretion of the specifying agency if the supplier warrants that the asphalt binder can be adequately pumped and mixed at temperatures that meet all applicable safety standards.

c. For quality control of unmodified PGAB production, measurement of the viscosity of the original PGAB may be used to supplement dynamic shear measurements of $G^*/\sin\delta$ at test temperatures where the asphalt is a Newtonian fluid.

d. The PAV aging temperature is based on simulated climatic conditions and is one of three temperatures 90°C, 100°C or 110°C. The PAV aging temperature is 100°C for PG58- and above, except in desert climat where it is 110°C.

e. Physical Hardening - TP1 is performed on a set of asphalt beams according to Section 13.1, except the conditioning time is extended to 24 hrs ± 10 minutes at 10°C above the minimum performance temperature. The 24-hour stiffness and m-value are reported for information purposes only.

f. If the creep stiffness is below 300 MPa, the direct tension test is not required. If the creep stiffness between 300 and 600 MPa the direct tension failure strain requirement can be used in lieu of the creep stiffness requirement. The m-value requirement must be satisfied in both cases.

g. $G^*/\sin\delta$ = high temperature stiffness and $G^*\sin\delta$ = intermediate temperature stiffness.

SECTION 4 - ASPHALT CONCRETE HOT MIXED - HOT PLACED

1.0 DESCRIPTION

Asphalt concrete is defined as a carefully controlled mixture of penetration grade PGAB and mineral aggregate thoroughly mixed to be free from segregation and contamination and then placed and compacted to a uniform density and smooth finish. This section includes requirements applicable to: quality control, materials, manufacturing, transportation, placing, compaction, finishing, measurement and payment of asphalt concrete.

2.0 REFERENCES

All reference standards shall be current issue or latest revision at the first date of tender advertisement. This specification refers to the following standards, specifications or publications:

- Division 4 Section 1, Emulsified Asphalt
- Division 4 Section 2, PGAB
- Occupational Health and Safety Act
- Environmental Protection Act
- 1981 Asphalt Paving Plant Regulations
- British Standard 812, Flakiness Index
- AASHTO T 283, Resistance of Compacted Bituminous Mixture to Moisture Induced Damage
- ASTM C 88, Test Method for Soundness of Aggregates by use of Sodium Sulfate or Magnesium Sulfate
- ASTM C 117, Test Method for Material Finer Than 75µm (No. 200) Sieve in Mineral Aggregates by Washing
- ASTM C 127, Test Method for Specific Gravity and Absorption of Coarse Aggregate
- ASTM C 128, Test Method for Specific Gravity and Absorption of Fine Aggregate
- ASTM C 131, Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine
- ASTM C 136, Method for Sieve Analysis of Fine and Coarse Aggregates
- ASTM D 75, Practices for Sampling Aggregates
- ASTM D 140, Practice for Sampling Bituminous Materials
- ASTM D 546, Test Method for Sieve Analysis of Mineral Filler for Road and Paving Materials
- ASTM D 995, Specification for Requirements for Mixing Plants
- ASTM D 1559, Test Method for Resistance to Plastic Flow of Bituminous Mixtures Using Marshall Apparatus
- ASTM D 2041, Test Method for Theoretical Maximum Specific Gravity and Density of Bituminous Paving Mixtures
- ASTM D 2726, Test Method for Bulk Specific Gravity of Compacted Bituminous Mixtures Using Saturated Surface-Dry Specimens
- ASTM D 2950, Test Method for Density of Bituminous Concrete in Place by Nuclear Method
  ASTM D 3203, Standard Test Method for Air Voids in Compacted Bituminous Paving Mixtures
- ASTM D 3515, Specification for Hot-Mixed, Hot-Laid Bituminous Paving Mixtures
- ASTM D 4469, Method for Calculating Percent Asphalt Absorption by the Aggregate in an Asphalt Paving Mixture
- ASTM D 4791, Flat Particles, Elongated Particles, or Flat and Elongated Particles in Coarse Aggregate
- DOT&PW TM-2, Modified Petrographic Analysis
- DOT&PW TM-3, Fractured Particle Test

The limits of placing, spread rate and the Mix Type shall be as stated in the Special Provisions.

3.0 SUBMISSIONS AND DESIGN REQUIREMENTS

3.1 Certificate of Approval for Asphalt Plant. The Contractor shall obtain a certificate of approval for the Asphalt Concrete Plant from the Nova Scotia Department of the Environment prior to the commencement of work.

3.2 Mix Design. The asphalt concrete shall conform to ASTM D 3515 except as specified herein and in the Special Provisions.

The Contractor shall have a minimum of 1000 t of coarse aggregate and 1000 t of fine aggregate placed in stockpiles before samples for mix design purposes will be taken.

The Department or its representative will obtain samples of the aggregate and any additives and undertake the mix design. In all cases, a minimum of 14 days will be required for design purposes after the samples have been taken.

An initial design for all mixes (high friction and conventional) will be based on the use of aggregate sources as selected by the Contractor and will require the use of blending sand from additional sources where possible. A maximum of 15% blend sand may be used in the mix design for high friction and conventional mixes, however, the amount of blend sand eligible for haul payment shall be the actual tonnage of blend sand used on a daily basis, or up to 10% by mass of the total mix in which the blend sand was required. If the blend sand design does not meet the gradation requirements of Table 4.4.4, the Contractor shall make adjustments to meet the requirements of Table 4.4.4 and Table 4.4.1. The results of each mix design will be provided to the Contractor.

Table 4.4.1 - Physical Requirements Of Asphalt Concrete

Item	Standard	Requirements	Application Road Class	Mix Type
Marshall Stability(1) @ 60°C, kN	ASTM D 1559	MIN 7.5	Freeway, Arterial, Truck Route	A,B,B-HF, C, C-HF & D
		MIN 6.0	Collector	B,C & D
		MIN 4.5	Local	B,C, & D
Marshall Flow, mm	ASTM D 1559	2 - 4(3)		A,B,B-HF, C, C- HF, D& E
Voids in Mineral Aggregate(2), %	ASTM D 2041, ASTM D 4469	MIN 15		D-HF, D & E
		MIN 14		C,C-HF
		MIN 13		B & B-HF
		MIN 12		A
Air Voids, %	ASTM D 2041	3 - 5		A,B,B-HF C, C-HF,D & E
VFA(4), %		65 - 78		A,B,B-HF C, C-HF,D & E

(1) Each Marshall specimen shall receive 75 blows on each face.
(2) Bulk Specific Gravity calculated on Oven Dry basis
(3) Equivalent to 8-16 Marshall units (units of 0.25 mm each)
(4) VFA will be 70-80% for roads of <1000 AADT.

3.2.1 Field Adjusted Mix Design. The final laboratory mix design will be implemented as the initial trial for plant mix with any necessary adjustments immediately being made by the Department or its representative. These adjustments will be documented as the Field Adjusted Mix Design (FAMD). Any additional adjustments will result in an additional documented FAMD. Copies of all FAMD will be provided to the Contractor.

All Field Adjusted Mix Designs shall meet the requirements of Table 4.4.4, Table 4.4.1 and Subsection 3.2.2. All quality control tests will be measured against the documented FAMD.

3.2.2 Mix Tolerance. The maximum permissible variation from the Field Adjusted Mix Design for gradation (total aggregate) and PGAB content in percent by mass shall be as follows:

5 000 sieve and larger	± 5
Held on 1250 sieve	± 3
Held on 160 sieve	± 2
Held on 80 sieve	± 1
PGAB	± 0.3

3.3 Additives. Additives shall not be used in the mix without the approval of the Engineer. Any additive intended for use shall be incorporated in the mix design in the proportion to be used during production and in accordance with the Manufacturer's specifications. If silicone is being added to the PGAB then care shall be taken to ensure that it is being added at only one location i.e. at the refinery, in the tanker truck, or at the plant.

The Department may permit the use of antistripping agents.

All additives, except anti-stripping additives, shall be included in the unit price for Asphalt Concrete.

3.4 Asphalt Concrete Stripping. The Contractor is hereby advised that if their aggregate for asphalt concrete is moisture susceptible they shall have the option of either using a liquid anti-stripping additive from the Department's list of acceptable products, using hydrated lime, or changing their source of aggregate.

The Department may determine that an anti-stripping additive is required if one of the following conditions occurs:

- The long term tensile strength ratio of the asphalt concrete as per AASHTO T 283 is less than 0.73
- Material that has been conditioned per AASHTO T 283 meets the 0.73 minimum requirement but a visual examination indicates there is evidence of stripping
- If based on past performance the aggregate source is known to be prone to stripping

3.4.1 Testing Rejected Aggregate Incorporating Anti-Stripping Agents. If the aggregate for asphalt concrete fails the Stripping Test, the Contractor at their own expense for all related testing, may request through the Project Engineer that the Department's Quality Control Consultant conduct a second set of Stripping Tests, this time incorporating an anti-stripping agent. Approval to use an anti-stripping agent will only be given if it is determined from this testing that the long term TSR of the mix with an anti-stripping agent equals or exceeds 0.73 and the visual examination indicates there is no evidence of stripping. The Contractor shall also demonstrate the capability of properly adding hydrated lime to the mix at the hot-mix plant if hydrated lime is proposed for use as an anti-stripping agent. If the TSR is still less than 0.73, the aggregate will be rejected and the Contractor shall locate another aggregate source.

3.4.2 Approval of Anti-Stripping Agents. In all cases a minimum of 14 working days are required to perform the stripping test after the aggregates have been received by the inspection company. An additional 14 working days will be required for re-testing of aggregate with an anti-stripping agent. The Contractor shall provide the anti-stripping agents to be utilized in all testing as well as any technical information and Manufacturer's recommended addition rates.

3.4.3 Addition of Liquid Anti-Stripping Additive. The liquid anti-stripping additive shall be added at a rate as determined by the mix design to the PGAB at the Supplier's depot, concurrently, with loading of the PGAB into the Carriers tanker. Any other methods of adding liquid anti-stripping additive shall be subject to the approval of the Engineer. The Contractor shall be required to demonstrate the method to the Engineer before approval will be considered.

The Contractor shall supply in writing to the Department, the supplier's name, product name and percentage of liquid anti-stripping additive used for each tanker load of PGAB delivered to the Contract.

3.4.4 Pavers Placing Asphalt Containing Liquid Anti-Stripping Agents. If required, and the Contractor elects to use a liquid anti-stripping additive, all pavers used to place asphalt concrete containing liquid anti-stripping additive shall be equipped with an engineered control ventilation system with a minimum controlled indoor capture efficiency of 80%.

3.4.5 Weather Conditions on Projects Containing Liquid Anti-Stripping Additives. If required, and the Contractor elects to use a liquid anti-stripping additive, the Contractor is advised that special precautions and scheduling of work may be necessary to effectively and safely produce and place asphalt concrete.

Contractors are advised that certain weather conditions such as fog, high humidity or rain require special precautions and these conditions may necessitate a shut down of operations.

If the Project Engineer determines that weather conditions are not acceptable, asphalt concrete shall not be placed. The Department takes no responsibility for costs associated with job shut downs and asphalt concrete which is not placed as a result of unacceptable weather conditions.

3.4.6 Payment for Liquid Anti-Stripping Additives. If required, and the Contractor elects to use a liquid anti-stripping additive, the Department will pay an amount as specified in the Contract Special Provisions for the use of an acceptable liquid anti-stripping agent which shall be full compensation for supplying, transporting and all related costs and labour incidental to the work.

If required, and the Contractor elects to use a hydrated lime as an anti-stripping additive, the Department will pay an amount as specified in the Contract Special Provisions for the use of hydrated lime which shall be full compensation for supplying, transporting and all related costs and labour incidental to the work.

4.0 MATERIALS

4.1 Aggregates. The aggregates shall be crushed pit run or quarried stone or slag and sand conforming to the quality requirements as stated herein and shall be free from coatings of clay, silt or other deleterious material.

4.1.1 Supply of Aggregates. It shall be the Contractor's responsibility to locate, procure and/or manufacture and deliver all aggregates, including blend sand or blending stone, required to meet the specified combined aggregate gradation requirements or to meet other specified properties of the aggregate and of the asphalt concrete. Promptly after receiving notice of award of contract, the Contractor shall inform the Engineer of the location of all aggregate sources.

Preliminary or previous approval of any aggregate shall not constitute a final approval of that aggregate.

4.1.2 Blend Sand. A definition of blend sand is as follows: Blend sand is a material added to a mix for the purpose of enhancing mix properties and workability. Blend sand may be either a natural uncrushed fine aggregate or a manufactured sand.

The maximum amount of natural uncrushed fine aggregate used as a blend sand shall be limited to 15% of the total aggregate in all mix types.

4.1.3 Supply of Blend Sand. After the Field Adjusted Mix Design has been developed (as outlined in Subsection 3.2.1) a supply of at least one day's production of blend sand shall be maintained in stockpile at all times

4.1.4 Blending Aggregates. Blending of aggregates from two or more sources will only be permitted when the Petrographic Number (PN) for the aggregate from any of the sources does not exceed the specified Petrographic Number by more than 10%.

The minimum amount of blended coarse aggregate shall not be less than 10% of the stone fraction. The coarse aggregate shall be blended through the cold feed bins.

Sand from another source may be used without blending, provided the stone from which the sand is produced has a PN not more than 10% higher than the specified PN. The stone portion of the mix shall have a PN less than or equal to the specified PN.

4.1.5 Physical Requirements of Aggregates. The physical requirements of the aggregates shall be as shown in Table 4.4.2 and Table 4.4.3.

Table 4.4.2 - Physical Requirements of Aggregate(1)

Test Name	Standard(2)	Requirement
Los Angeles Abrasion, %	ASTM C 131	Max. 35
Soundness, %(3)	ASTM C 88(2)	Max. 15
Fractured(4) Particles, 2 Fractured Faces, % by Mass(5)	DOT&PW(7)	See Table 4.4.3
Petrographic Number(4)	DOT&PW(7)	See Table 4.4.3
Stripping Test, %	AASHTO T 283	Min. 0.73
Absorption, %(6)	ASTM C 127	Max. 1.75
Flat and Elongated Particles (4:1)	ASTM D 4791	Max. 10

(1) Applies to all aggregates including those used for blending.

(2) Latest edition

(3) The soundness loss permitted will be 15% on fine aggregate other than for A, B-HF, C and C-HF. Soundness loss on fines for A, B-HF, C and C-HF, will be 10%.

(4) In the event of a disagreement regarding the Petrographic Number or Fractured Particles percentage, the Contractor shall note their objections in writing to the Engineer such that the Engineer will notify the Manager of Technical Services of impending referee testing. An analysis will then be done, as follows:

- The Manager of Technical Services will arrange to have the stockpile sampled. If a Technical Services

Specialist is not available to sample, the Engineer will sample the stockpile. The Contractor will observe the sampling procedure.

- The sample will be taken to Technical Services. All Consultants that are retained by the Department for asphalt concrete quality control or a minimum of two consultants, will be asked to send a representative to Technical Services to test a representative portion of the sample.
- The sample will be split and each Technician will perform the Petrographic test or Fractured Particles Test. The results will be given to Executive Director District Operations, who will make the final decision with respect to the use of the aggregate, using the average of the test results as a guide.

(5) Fine aggregate shall have maximum absorption of 2.0 % when tested by ASTM C 128.

(6) Test to be performed using sodium sulphate.

(7) Standard test procedures are available from Technical Services, if requested.

(8) A fractured particle consists of two (2) fractured faces which each consist of a minimum of 20% of the surface area of the particle.

Table 4.4.3 - Quality of Coarse Aggregate vs AADT

Type	AADT(1)	PN	Fractured Particles, %
A	N/A	135	95(2)
B-HF	N/A	135	95(2)
C-HF	N/A	135	95(2)
D-HF	N/A	135	95(2)
C	2500-4000	150	70
C	1000-2499	150	40
B	1000-2499	180	40
C	Below 1000	180	40
B	Below 1000	180	40
D	N/A	N/A	N/A
E	N/A	180	40

(1) Average Annual Daily Traffic

(2) The coarse aggregate shall be made from a quarried source or contain 95% fracture particles.

The fine aggregate shall be produced from bedrock, or in the case of a natural deposit, from the aggregate held on the 10 000 sieve. A tolerance of 10% passing the 10 000 sieve, based on a washed sieve analysis, will be permitted.

4.1.6 Gradation of Combined Aggregate. The gradation of the combined processed aggregate for the asphalt concrete shall conform to the values shown in Table 4.4.4 when tested by washed sieve analysis according to ASTM C 117, C 136 and D 546.

Table 4.4.4 - Gradation of Combined Aggregates

Sieve Designation	Cumulative Percent Passing							
	Type A	Type B	Type B-HF	Type C	Type C-HF	Type D	D-HF	Type E
40 000	100							
28 000	95-100	100	100					
20 000	-	95-100	95-100	100	100			100
14 000	60-80	-	70-90	95-100	95-100	100	100	85-100
10 000	-	60-80	60-75	-	-	95-100	70-90	-
5 000	25-60	35-65	40-55	45- 70	45-60	60- 80	55-70	65- 80
2 500	15-45	20-50	25-45	25- 55	25-55	35- 65	25-55	50- 65
315	3-18	3-20	3-20	5- 20	5-20	6- 25	5-20	18- 30
80	1-7	2- 8	3- 6.5	2-9	3-6.5	2-10	2-9	5- 15
Normal Usage	Base	Base/ Surface	Base/ Surface	Surface	Surface	Surface	Surface	Curbs/ Gutters Medians

4.1.7 Stockpiling of Aggregates. Aggregates shall be stockpiled as herein described so as to limit segregation, intermingling and contamination. Where the location of aggregate manufacture is different from the location of asphalt concrete production, stockpiles at all locations shall comply. Only those aggregates placed in stockpiles approved by the Department shall be used. Stockpiles shall be formed on evenly graded and well drained areas. Stockpiling shall not commence until the site is approved by the Engineer considering the total area required based on the maximum height allowed and the minimum quantity to be stored in the stockpiles.

The aggregate for asphalt concrete shall be separated into a coarse fraction and a fine fraction and the two fractions shall be placed in separate stockpiles.

The coarse aggregate stockpile(s) shall contain a minimum of 80% retained on the 5000 sieve by washed sieve analysis.

The fine aggregate stockpile shall contain a minimum of 80% passing the 5000 sieve by washed sieve analysis.

Stockpiles shall be built in layers not exceeding I m in thickness for coarse aggregate nor 2 m in thickness for fine aggregate. Each layer shall be constructed over the entire area before the next layer is begun. The maximum height shall not exceed 4 m. Coning, end dumping or pushing aggregate over the edge of stockpiles will not be permitted. Aggregates, delivered in trucks or loaders, shall be uniformly spot dumped and the stockpile built as specified in the foregoing.

Stockpiles shall be separated either by bulkheads or distance to avoid intermingling of material in one stockpile with that in another stockpile. Placing of unacceptable aggregate on previously accepted aggregate shall be cause for rejection of the entire stockpile. Payment will not be made for any aggregate left in stockpile.

4.1.8 Quantity of Aggregate in Stockpile During Mix Production. The quantity of aggregate in stockpile during periods of mix production shall be the minimum of 20 hours of production for both coarse and fine aggregate or the quantity required to complete the job.

4.2 PGAB, Supply and Inventory. The Contractor shall supply and transport all PGAB, used in the manufacture of asphalt concrete, in accordance with Division 4 Section 2.

The quantity of PGAB in the Contractor's storage tank(s) at the beginning and end of a job will be determined by the Engineer.

If there is PGAB in the Contractor's tank(s) at the beginning of the job that is not acceptable for use by the Department it shall be removed. If the tank is contaminated with hydrocarbon fuels or solvents, it shall be cleaned to remove all contaminants before PGAB to be used on the job is placed in the tank(s).

If there is PGAB that belongs to the Contractor in the tank(s) at the beginning of the job, and provided it meets Department's specifications, the Contractor may use it in the work.

4.3 Anti-Stripping Agents. The anti-stripping agents shall consist of one of the following:
- Hydrated Lime ($Ca(OH)_2$)
- Liquid Anti-Stripping Agent

4.3.1 Lime

4.3.1.1 Lime Storage. When hydrated lime is used as an anti-stripping agent, the Contractor shall have the capability of storing 50 t of lime at the hot-mix plant. The storage facility shall maintain the lime in dry condition and shall be capable of agitating the lime by air or other means to keep it in a uniform, free flowing condition. Storage facilities shall have the capability to accept shipments of lime while the asphalt plant is in operation.

4.3.1.2 Metering/Feeder System-General. The hydrated lime proportioning or metering/feeder system shall be controlled by a mass or volumetric device which shall be accurate to within ±10% of the amount required. The lime metering/feeder system shall be capable of uniformly delivering lime in quantities between 0.5 to 2.5% by dry weight of aggregate. Lime shall be drawn from a storage facility as specified herein.

The lime metering/feeder system shall display the following:
- percent moisture in the total aggregate;
- tonnes per hour of dry aggregate;
- tonnes per hour of lime.

The display output shall be from actual continuous scale readings.

4.3.1.2.1 Mass or Weight System. This type of hydrated lime proportioning system shall consist of a continuous feeder system which shall proportion the flow rate of lime by mass or weight. The lime feeding system shall be controlled by a positive weighing system. The system shall have the capability of continuously monitoring the flow rate of dry aggregate in tonnes per hour. The system shall automatically adjust the flow of lime for any change in dry aggregate flow rate.

4.3.1.2.2 Volume System. This type of lime proportioning system shall be a vane type metering device which is interlocked to the flow of each aggregate. The drive shaft on the vane feeder shall be equipped with a revolution counter and a means of varying the rate.

4.3.1.3 Moisture Correction. The combined moisture content of the aggregates shall be entered into the lime metering/feeder control system and the system shall be capable of providing a dry aggregate tonnes per hour signal to the lime/feeder control.

4.3.1.4 Positive Signal System. The lime metering/feeder system shall contain a positive signal system that automatically shuts down the plant after a 15 second delay or if there is a disruption of flow of lime or water.

4.3.1.5 Monitoring System. The lime metering/feeder system shall contain a means of determining the quantity of lime being introduced into the aggregate while the plant is operating.

4.3.1.6 Calibration. The Contractor shall check the calibration of the lime metering/feeder system prior to the production of asphalt concrete or as directed by the Engineer.

4.3.1.7 Water Delivery System. When dry hydrated lime is utilized, a water delivery system shall be used to dampen the combined aggregates on the cold feed belt to a moisture content between 1.5 to 3.0% above the combined saturated surface dry moisture content of the aggregates. The water delivery system shall consist of a spray bar with a minimum of 3 equally spaced spray nozzles. The spray bar shall be located so as to wet the aggregate prior to the addition of the lime.

4.3.1.8 Water. Potable water or water that is clean and free of dirt, silt and deleterious material shall be used as a wetting agent.

4.3.1.9 Addition of Lime. Lime shall be added to the aggregate by the dry method or the slurry method.

4.3.1.9.1 Dry Method. Hydrated lime shall be drawn from a lime storage facility by metering/feeder system and combined with aggregate and water with a mixing device as specified herein.

4.3.1.9.2 Slurry Method. A slurry containing one part hydrated lime and three parts water by mass shall be used. The slurry shall be prepared in a central mixing tank provided with agitation to keep the lime in suspension until applied to the aggregate. The plant shall be equipped with suitable pumps and meters for introducing the required amount of slurry to the aggregate. The addition of hydrated lime in the form of a slurry form shall not require adding moisture to the aggregate prior to mixing of the lime slurry and aggregate.

4.3.1.10 Mixing Device. Mixing of the aggregate and lime for either the dry or slurry methods shall be accomplished by passing the combined materials:

- through a scalping screen
- through a set of plows or mixing paddles on the cold feed belt
- an in-line pugmill placed in the cold feed system between the gathering conveyor and the charging conveyor

4.3.2 Liquid Anti-Stripping Additives. The products on the following list have been subjected to an internal review by the Department respecting formulation and the toxicology of ingredients and have been determined to meet Department criteria for use on paving projects. The acceptable liquid anti-stripping additives are as listed in Table 4.4.5.

Table 4.4.5 - Anti-Strip Additives

Supplier	Product
Akzo Nobel Chemicals	Redicote 95-S
Morton International	Pave Bond "T" Lite
Morton International	Pave Bond Lite
Travis Chemicals	Travcor 4501
Win Chemicals Ltd.	WinSurf 129-A
ARR-MAZ Products	AD-here LOF 6500

Inclusion on this list does not attest to efficacy of use with any specific aggregate or approval for use on any specific project. Testing for each project shall be required for this purpose. This list is subject to revision.

4.3.2.1 Information Sessions and Worker Training. At a pre-construction meeting the Contractor shall inform the Engineer of the supplier's name and product name of liquid anti-stripping additive that is to be used on the contract if one is required. At this time the Contractor and the Department will review the requirements for use of the liquid anti-stripping additive, including proper procedures, worker information, use of protective clothing and equipment, removal of sensitive workers, site supervision and contingency system.

The Contractor shall advise workers of the proper procedures to be followed when working with PGAB or asphalt concrete containing liquid anti-stripping additive.

The Contractor shall ensure that Carriers retained to haul the PGAB containing liquid anti-stripping additive have received training with respect to working with PGAB containing liquid anti-stripping additive.

The Department shall provide training with respect to working with PGAB or asphalt concrete containing liquid anti-stripping additive for its employees or representatives.

4.3.2.2 Mandatory Respiratory Protection. The Contractor shall provide at their expense Respiratory Protective Equipment for any of their staff that are directly exposed to the concentrated vapours of PGAB containing liquid anti-stripping additive (unless exhaust ventilation is provided) such as those who may be subjected to the plume from the PGAB storage tank. The Contractor shall ensure that these staff wear the Respiratory Protective Equipment. (The Department shall provide at its expense similar protective equipment for its employees or representatives and shall ensure that the protective equipment is worn.)

4.3.2.3 Voluntary Respiratory Protection. The Contractor shall provide upon the request of its employee, and at the Contractor's expense, Respiratory Protective Equipment for any of their employees who feel they are adversely affected (eye, nose, throat, lung irritation, nausea, etc.) by the odors of the asphalt concrete containing liquid anti-stripping additive. (The Department will provide at its expense and upon request similar protective equipment for its employees or representatives.)

4.3.2.4 Respiratory Protective Equipment Specifications. Respiratory Protective Equipment shall consist of a full face mask, to protect eyes as well as respiratory system, and shall be equipped with organic vapour cartridges and dust pre-filters. Cartridges shall be replaced whenever the smell of vapours is detected by the worker using the respirator. Pre-filters shall be replaced when they become visibly dirty or when resistance to breathing becomes noticeable.

4.3.2.5 Relocation of Worker Sensitive to Liquid Anti-Stripping Additive When Wearing Respiratory Protective Equipment. The Contractor shall, at the request of a worker adversely affected by the vapours of PGAB containing liquid anti-stripping additive or the odours of asphalt concrete containing liquid anti-stripping additive (who cannot be adequately protected by wearing respiratory protective equipment) relocate the worker to work in an area where the worker is not affected.

If the Contractor recognizes that a worker adversely affected, the Contractor shall relocate that worker to work in an area where the worker is not affected.

The Department will, at the request of an employee adversely affected by the vapours of PGAB containing liquid anti-stripping additive or the odours of asphalt concrete containing liquid anti-stripping additive (who cannot be adequately protected by wearing respiratory protective equipment) relocate the employee to work in an area where the employee is not affected. Relocating a Department employee sensitive to anti-stripping vapours may result in minor delays to the paving operations.

If the Department recognizes that a worker is adversely affected, the Department will relocate that worker to work in an area where the worker is not affected.

4.3.2.6 Monitoring of Air Quality. The Department will, at its expense on some contracts, monitor the air quality at various locations of the paving operations. The Contractor shall cooperate with respect to this testing, by providing access to all aspects of the paving operation to the Department or its representative.

4.3.2.7 Contingency System. The Contractor shall have an employee on site who will be authorized (this employee shall be identified at the pre-construction meeting) to make decisions regarding any difficulties that may arise during the paving project.

5.0 CONSTRUCTION METHODS

5.1 Manufacturing Mix

5.1.1 Hot Mix Plants. All manufacturing shall be done with either a batch, drum or continuous mixing plant. All plants shall conform to the requirements of ASTM D995 and as specified herein. The Contractor shall ensure that the hot mix plant is operating properly so that unburned burner fuel does not contaminate the asphalt concrete.

5.1.1.1 Cold Bins. Cold bins for all mixes shall be divided into not less than three compartments. Each compartment shall be equipped with its own gate control to enable accurate proportioning of each aggregate. Dimensions of each compartment shall be such that free flow of aggregate can be attained at all times. Contamination of the aggregate designated to be placed in each compartment before or after placement in the bins shall be cause for rejection of the material.

If the cold bins are being fed with a front end loader the Contractor shall ensure that there is no spillage from the loader bucket such that aggregate of one size is spilled into a bin containing aggregate of a different size.

5.1.1.2 Feed for Dryer. The plant shall be provided with mechanical means for uniformly and accurately feeding aggregate into the dryer so that a consistent mixture and temperature can be achieved.

5.1.1.3 Dust Collector. The plant shall be operated so that emissions are in accordance with the 'Asphalt Paving Plant Regulations'.

5.1.1.4 PGAB Storage Tanks. Storage tanks shall be insulated and equipped with heaters to maintain the PGAB at the spraying temperature given in Division 4 Section. Each tank shall be equipped with thermometric equipment that indicates within 5°C, the actual temperature of the PGAB. Safe and easy access shall be provided to the hatch to facilitate sampling and measuring the level of PGAB in the tank(s). The Contractor shall be responsible to supply an acceptable device for measuring the level of PGAB and an accurate calibration chart for each tank. The Contractor shall ensure that contamination of the mix does not occur through the introduction of heating oil. The use of hydrocarbon fuels or solvents to flush hoses and/or pumps shall not be permitted.

5.1.1.5 Sampling Stand. The Contractor shall provide, install and maintain a stand for the purpose of sampling asphalt concrete from loaded trucks. It shall be of solid construction, safe, firmly anchored, of a height to enable easy acquisition of samples from the haul vehicles. The stand shall have a platform of minimum dimensions area of 3 m in length and 1 m in width, be equipped with stairs and be completely enclosed with guard and hand rails and it shall be placed in a suitable location.

5.1.1.6 Production Rate. Plants shall be operated at a rate which allows them to produce high quality mix, consistent with the Manufacturers recommendations. They shall also be operated at a rate to provide continuous operation compatible with the rate of placing the mix.

5.1.2 Batch and Continuous Mix Plants. In addition to the general requirements in Subsection 5.1, the following shall apply:

5.1.2.1 Aggregate Preparation (See also Sections 6.2.1, 6.2.2 and 6.2.3). Aggregate shall be fed to the cold bins from approved stockpiles and not directly from the crusher. Feed from the cold bins to the dryer shall be in proper proportions and at a rate to permit uniform temperature control. The aggregate shall be dried and transported to the pugmill at a temperature between 135°C and 160°C. The actual temperature shall be determined based on the penetration grade of the PGAB, the ambient temperature and workability, but shall be as low as possible to permit proper mixing, placing, compacting and finishing.

Immediately after heating, the aggregate shall be screened into bins with separation on the 5000 sieve and such other coarse sieve sizes as the number of bins permit.

The quantity of aggregate in stockpile at the asphalt plant site during periods of mix production shall be at least equal to the amount required for 20 hours of mix production or the quantity required to complete the job.

5.1.2.2 Proportioning and Mixing. Each size of aggregate and the PGAB shall be measured separately and accurately in the proportions in which they are to be mixed. The depth of material in the pugmill shall be set so that there are no dead areas and the asphalt concrete is uniformly mixed.

In batch plants, dry mixing shall be for 15 seconds and after even distribution of the PGAB, a minimum of 30 seconds wet mixing, or according to the manufacturers specification.

Continuous mix plants shall have a minimum mixing cycle as calculated by the formula in ASTM D 995, but no less than 45 seconds.

Provision shall be made to waste all of the dust or to uniformly return any or all of the dust as required to meet the specifications.

5.1.3 Drum Mix Plants. In addition to information in Section 5.1.1, the following shall apply:

5.1.3.1 Aggregate Preparation (See also Subsection 4.1.7). Continuous testing of the aggregate produced during the crushing operations shall be performed and upon completion of crushing of the initial 1500 t of fine aggregate and 1500 t of coarse aggregate, a mean value for percent passing the 5000 sieve for each shall be determined. The mean values are referred to as design values. Aggregates crushed henceforth must have gradation within 5% of the design values and also comply with the 80% requirement in Subsection 4.1.7.

5.1.3.2 Cold Feed System. Each cold feed bin shall be adjusted and calibrated to the manufacturer's specification; have partitions adequate to prevent the intermingling of aggregate; feed only one aggregate size through a fully adjustable gate; and have the belt conveyor controlled remotely by variable speed motors that will permit precise speed adjustment.

A belt scale shall be provided on the cold feed conveyor and shall be calibrated to the manufacturer's tolerance at the start of each project, or whenever the weighing conveyor is moved or when deemed necessary by the Engineer. The weighing conveyor shall be equipped with a self-cleaning system to eliminate weighing errors. The belt conveyor shall be set at the tension recommended by the manufacturer.

A positive interlocked automatic shutoff shall be provided so that the plant will shut down automatically after a 15 second delay or if there is a disruption in the flow of aggregate.

A vibratory scalping screen of adequate size and capacity shall be provided to remove oversize material from the combined cold feed belt. Provision shall be made to divert the aggregate passing the vibrating screen to allow sampling by the Department or it representative. Monitoring probes shall be installed to monitor the moisture in the aggregate.

5.1.3.3 PGAB Distribution. The PGAB delivery system shall be equipped with a flow switch which shall automatically stop the plant if any interruption occurs in the flow of PGAB. A temperature correction device shall be used to compensate for the specific gravity of the PGAB. The system shall be equipped with a bypass to permit weighing and calibration.

5.1.3.4 Calibration. The Contractor shall have competent personnel available to calibrate and maintain all electronic, electrical and mechanical controls.

The Contractor shall maintain at the plant a copy of the manufacturer's manual which contains the method of calibrating which shall be used to perform the initial calibration after assembly and prior to production. The calibration of the plant shall be carried out under the supervision of the Department or its Representative.

Generally initial calibration shall consist of cold feed and PGAB metering pump calibration. Each cold bin shall be calibrated separately by diverting the flow from the bin into a properly tared truck. The PGAB metering pump shall be calibrated by diverting the flow into a tared tank truck.

Graphs shall be prepared for each bin showing the flow in tonnes per hour (tph) (moisture corrected) plotted against the plant readout for the variable speed motors. A graph shall also be prepared showing the tph of PGAB plotted against the plant readout for the pump.

When an aggregate source is changed, the cold feed system shall be calibrated. At the start of each day the assembly shall be stabilized. A known mass shall be placed on the weighing conveyor to verify the plant readout. During production, the moisture content of each aggregate in the cold feed bins shall be determined before noon and also after noon. Changes will be made in the plant settings due to changes in moisture. Adjustments shall be made until all plant settings agree with design tph and the tph from the calibration graphs.

5.1.3.5 Production. The Contractor shall supply to the Project Engineer at the project pre-job meeting, the asphalt plant manufacturer's specification for each individual plant;

- the specified rate of production in tonnes per hour versus aggregate moisture content, the Contractor shall adhere to the manufacturer's production rates
- the specified location of the PGAB delivery pipe within the drum of the asphalt drum mix plant
- production will not commence until the location of the PGAB delivery pipe is verified by visual inspection at the start of the paving season or as deemed necessary by the Department
- deviations from the manufacturer's specification will not be permitted

The aggregate shall be sufficiently dried as evidenced by the lack of noticeable steaming and bubbling of the asphalt concrete, and by the absence of any visible free water seepage from the storage silo, or the truck bodies. If any of these conditions are evident it shall be cause for rejection of the asphalt concrete.

A system for diverting unacceptable material shall be provided between the drum and the storage silo or surge bin. The moisture content of the asphalt concrete at discharge shall be determined daily and shall not exceed 0.5%. The temperature of asphalt concrete shall be automatically recorded.

5.1.3.6 Storage. Drum mix plants shall be equipped with either a silo or a surge bin, capable of delivering a homogenous, non-segregated and non-contaminated asphalt concrete into the trucks. Silos shall be maintained at least half full and be equipped at the top with a tripping hopper. The silo shall be equipped with a device to indicate if the silo is half full.

The tripping hopper shall be coordinated with plant production and shall close before complete discharge to prevent any free fall of asphalt concrete into the silo. Storage in the silo up to 20 hours shall be permitted provided that the penetration of the PGAB recovered from the stored asphalt concrete is equal to or greater than the penetration after the thin film oven test of the original PGAB before mixing and also the temperature remains such that the asphalt concrete does not arrive at the paver below 125°C.

5.2 Loading, Transporting, Unloading. Asphalt concrete shall be discharged from the plant into truck bodies using a minimum of three drops to fill the body. The truck shall be repositioned between drops such that the first drop is toward the front of the box, the second drop is toward the rear of the box, and the third drop is in the middle.

At no time shall the asphalt concrete be allowed to trickle through the surge bin or silo into the truck body. Asphalt concrete shall be transported from the paving plant to the work site in vehicles with smooth metal bodies, free from leaks and previously cleaned of all foreign materials. Vehicles shall be equipped with tarpaulins of water repellant material with a maximum mesh size of 0.5 mm when stretched, a minimum melting point of 200°C and of sufficient size to completely cover truck bodies from edge of box to edge of box and overlap the tailgate. Tarps shall be in good condition and shall have no holes or tears. The tarps shall be securely tied down so there is no visible opening between the truck box and tarp. Vehicles shall also be equipped with wind deflectors at the front of the truck box. If it is raining or if the temperature of the asphalt concrete drops more than 10°C between the time of leaving the plant and placing on the road, tarpaulins shall be used. Tarpaulins shall be used at any other time at the Engineer's request.

The use of Hydrocarbon fuels or solvents to lubricate the truck bodies or to clean tools or equipment, will not be permitted. A biodegradable release agent shall be supplied by the Contractor to clean or lubricate tools, equipment and truck bodies.

Trucks will stop slightly ahead of the paver and the paver will move ahead and smoothly pick up the truck. To reduce segregation, prior to backing into the spreader the truck body shall be partially elevated before the tail gate is tripped to promote a mass of material deposited in the hopper.

5.3 Placing. Asphalt concrete shall be placed upon a prepared surface which is free from standing water and cleaned of all loose or foreign material.

On repaving projects, before placing of new pavement, the existing pavement shall be tacked as per Division 4, Section 1, Emulsified Asphalt. When the pavement has been left over the Winter, it shall be cleaned and tacked before new pavement is placed.

New pavement may be applied directly over a freshly placed mat without applying tack coat, such as when multiple lifts are being placed within the same construction season.

Placement shall not take place during rain, or when the surface is frozen, nor when the ambient temperature is below 5°C, unless otherwise directed by the Engineer.

The placing of asphalt concrete shall be at a constant and even rate of speed.

The spread rate for each lift shall not vary more than 15 kg/m^2 from that specified by the Engineer. The maximum spread rate allowed will be 135 kg/m ^{2} unless otherwise approved by the Engineer.

5.3.1 Mechanical Pavers & Their Operation. Unless otherwise permitted by the Engineer, the asphalt concrete shall be spread by a mechanical self-powered paver in good working condition capable of achieving the specified grade, line and crown.

Pavers shall be equipped with hoppers and reversing distributing screws to place the asphalt concrete evenly in front of adjustable screeds. The asphalt concrete shall be dumped in the centre of the hoppers such that no spilling occurs on the road surface. Any asphalt concrete spilled accidentally shall be shovelled from in front of the spreader and wasted or placed in the hopper. The hopper shall not be emptied to less than 25% of capacity while moving forward except when the spreading operation is being suspended (i.e. as the end of the day). Wings of the paver shall only be dumped when the asphalt concrete has built up so that a truck cannot be unloaded. Any cold or segregated material must be shovelled out and wasted.

Any segregated asphalt concrete in the hopper shall be shovelled out between truck loads and wasted. The distributing screws shall always be kept between 1/3 and 2/3 covered. Pavers shall employ equalizing runners, straightedge runners, even-arms and/or other compensating devices to adjust the grade and confine the edges of the asphalt concrete to the true lines without the use of stationary side forms. They shall be capable of spreading the asphalt concrete without segregation, to a thickness between 20 mm and 100 mm and in instances where a single paver is operating, that paver must be capable of continuous width adjustment. When paving in echelon one of the pavers must be capable of continuous width adjustment. Where a single paver is operating on a surface course, the width of paver shall be such that a longitudinal joint is not formed within a travel lane. The joints in the lower courses may be in the travelled lane but not directly in the wheel path.

Longitudinal joints between courses shall be offset by a minimum of 300 mm.

Pavers shall be equipped with adjustable vibrating screeds which are capable of being heated and produce a minimum vibrating frequency of 3000 vibrations per minute or as specified by the manufacturer. They shall be equipped with a maintained strike-off bar or tamper. The tamper shall knead the coarse particles to prevent tearing or dragging of the mat. The vibrating screed, including extensions, will provide initial compaction and must form a consistent texture and grade and shall operate across the entire width of the mat.

Immediately after the asphalt concrete is spread and before rolling operations begin, the surface shall be inspected and any irregularities repaired and adjustments made to the screed. Irregularities in alignment and grade along the outside edge shall also be corrected before the edge is rolled.

Special attention shall be given to the straight edging of each lift following initial rolling.

Approved automatic screed controls shall be used to regulate longitudinal grade and transverse slope when spreading Type B, Type B-HF, Type C, Type C-HF or Type D-HF on Freeways and/or Arterials.

Automatic screed controls shall be used on Collector or Local roadways at the mutual agreement of the Engineer and Contractor or if specified in the Special Provisions.

All pavers must be equipped with automatic joint matchers which shall be used to match to the grade of a previously placed adjacent mat.

Automatic screed controls for the control of longitudinal and transverse slope and joint matching shall be as recommended or supplied by the manufacturer of the paver. When use of the longitudinal automatic screed control is specified the first lift shall be controlled as to grade by an approved 9 m ski or floating beam. For all subsequent lifts the paver shall match the previous lift by using the shoe designed for that purpose.

5.3.2 Spreading Alternatives. In narrow base widening, deep or irregular sections, intersections, turnouts, or driveways, where it is impractical to use mechanical pavers to spread and finish the base, levelling or surface course, the Contractor may use other approved spreading equipment (graders etc.) or hand methods as directed by the Engineer. When the asphalt concrete is to be spread by hand, it shall be dumped and then spread with lutes or rakes. The Contractor will not be permitted to use shovels to spread the asphalt concrete by broadcasting it over the surface. Any part of the asphalt concrete that has formed into lumps and does not break down easily shall be discarded. The rakers will not be permitted to stand on the hot asphalt concrete, except where necessary to correct errors in the first raking. The hand placement and raking shall be performed in such a manner that a minimum amount of patching will be required.

5.3.3 Joint Construction. All joints shall be well bonded to form a continuous seal.

5.3.3.1 Transverse Joints. Transverse joints shall be formed by butt joints. When forming butt joints, the edge of the previously placed asphalt concrete shall be cut back to its full depth so as to expose a fresh surface after which it shall be coated with hot PGAB or tack coat or heated before fresh asphalt concrete is placed in contact with it. Heat shall be applied to the joint using a method approved by the Engineer with care taken not to overheat the existing asphalt concrete. The freshly placed asphalt concrete shall be raked to the proper depth and grade and then the transverse joints shall be rolled transversely (perpendicular to the travel lanes) and the compacted joint shall be inspected with a 3 m straightedge. If there is more than a 6 mm depression, the joint shall be reconstructed.

5.3.3.2 Keyed Joints. When overlaying existing asphalt concrete pavement, keyed joints (see Drawing HS404.DWG) shall be constructed at both ends of the Project repaved area, at all intersecting roads, ramps and at all bridge decks in the repaved area, to avoid a feather joint. Keys will only be required between the final lift of pavement and the existing pavement, unless otherwise directed by the Engineer.

The existing asphalt concrete pavement shall be removed to expose a vertical surface of a depth equal to the thickness of the final lift against which new asphalt concrete may be placed. The minimum slope measured parallel to the centre line of the milled area shall be 200 horizontal to 1 vertical (200H:1V). The angle that the joint makes with the centerline shall not exceed forty five (45°) degrees or as otherwise directed by the Engineer.

When existing pavement has been removed in advance of paving the joint area, the Contractor shall construct a smooth taper at the joint area to a slope of at least 50 horizontal to 1 vertical (50H:1V). The taper may be placed on tar paper and shall be removed just prior to paving the keyed area or as directed by the Engineer. The transverse joint shall be straight and have a vertical face when the taper is removed.

The associated cost of providing all keys shall be included in the price per tonne of asphalt concrete.

The paver shall not move more than 20 m from any transverse joint until that joint has been rolled and checked with a straight edge. If the joint is not satisfactory it shall be immediately corrected before the paver may proceed.

5.3.3.3 Longitudinal Joints.

5.3.3.3.1 Paving in Echelon

5.3.3.3.1.1 Paving / New Construction. Pavers shall be used in echelon to lay the mat full width. The pavers shall follow one behind the other so closely that cooling of the longitudinal joints between the mats is not permitted.

Adjacent mats must be completed to provide for exposed joint edges of maximum length of 100 m at the end of each day.

5.3.3.3.1.2 Pulverization / Repaving Projects. Pavers may be used in echelon to lay the surface full width, when practical, when traffic can be diverted and when production of the mixture can be maintained. The pavers shall follow one behind the other so closely that cooling of the longitudinal joints between the mats is not permitted.

Adjacent mats must be completed to provide for exposed joint edges of maximum length of 100 m at the end of each day.

5.3.3.3.2 Conventional Paving

5.3.3.3.2.1 Construction When not Paving in Echelon. Prior to placing the adjacent mat, the exposed edge of each longitudinal joint must be coated with emulsified asphalt (tack coat).

The material being placed in the abutting lanes shall be tightly crowded against the vertical face of the previously placed lane. The paver shall be positioned so that in spreading, the material overlaps the lane previously placed by 25 to 50 mm and should be left sufficiently high to allow for compaction. The width and depth of the overlapped material shall be kept uniform at all times.

The longitudinal joints may be constructed such that the freshly placed asphalt concrete may be humped by the back of the rake or lute which shall permit the roller to force and compact the asphalt concrete into the previously placed lift. During construction of the longitudinal joint, the rakers will not rake the coarse particles over the freshly placed asphalt concrete. Any surplus of coarse particles shall be wasted.

When constructing a joint near any adjoining edge that the spreader cannot reach, any spaces left open shall be filled by hand with asphalt concrete. This may be humped with the back of a rake or lute to a proper height as to receive maximum compaction.

Longitudinal joints in the top lift shall not be constructed within a travel lane except when paving in echelon or when paving tapers. Lower mats may have joints in the lane but not in the wheel path. Joints in succeeding lifts shall be offset a minimum of 300 mm.

Adjacent mats must be completed to provide for exposed joint edges of maximum length of 100 m at the end of each day.

In no case, shall a section of longitudinal joint be left exposed for greater than three (3) hours, that is, the adjacent mat must be placed along any section of previously placed mat within three (3) hours. The exception to the foregoing is the short (100 m or less) strip that may be exposed at the end of the day.

5.3.4 Placing Rate. Placing shall proceed in a continuous and steady manner. The paver speed shall therefore be regulated to the rate of plant production, however, placing must be at such a rate to provide for a satisfactory finish and specified compaction.

Ordinarily, there shall not be more than five (5) trucks waiting to unload ahead of the spreader.

5.4 Compacting and Finishing. The minimum density acceptable shall be 94% of the Theoretical Maximum Relative Density determined according to ASTM D 3203. The percent compaction shall be determined by comparing the core densities with the theoretical maximum relative density.

5.4.1 Rolling Operations - General. Compaction of the asphalt concrete shall be with any combination of rollers that can achieve the specified smoothness and density except that when compacting Type B-HF or Type C-HF, a pneumatic tired roller shall be used in the train. Also, there shall be at least one pneumatic tired roller in the train when it is determined specified compaction cannot be obtained or surface texture and smoothness acquired.

The Contractor shall demonstrate a rolling pattern for achieving compaction at the start of paving operations and the degree of compaction will be verified by the Department. This rolling pattern shall be maintained unless a change is approved by the Engineer.

When ending a pass, the roller shall turn to one side to avoid leaving a depression perpendicular to the centerline.

To avoid depressions in the asphalt concrete, rollers shall not be permitted to park on the hot mat.

All pneumatic tired rollers shall be skirted when air temperature is 10°C or lower or at the Engineer's request. When thin lifts are being placed, particularly if the air temperature is 10°C or lower, the plant production shall be reduced to allow for specified compaction procedures.

5.4.1.1 Rollers - General. Rollers shall be in good condition, capable of reversing direction without backlash and they shall be operated by competent and trained operators. The speed of steel wheeled rollers and pneumatic rollers shall not exceed 5 km/h and 8 km/h, respectively. The speed shall be slow enough to avoid displacement of the asphalt concrete. Any displacement occurring as a result of reversing the direction of the roller, or from any other cause shall be corrected. Rolling shall proceed continuously until all roller marks are removed and the specified compaction is achieved. Water or a biodegradable release agent shall be used on the roller wheels or tires to prevent adhesion of asphalt concrete. Hydrocarbon fuels or solvents shall not be permitted. Pneumatic tired rollers shall have a minimum mass of 3.5 t/m of width of tread. Vibratory rollers shall be capable of operating at a frequency of 2000 impacts per minute. The Department may use a tachometer to inspect the vibration frequency of each roller.

5.4.1.2 Number of Rollers. The minimum number of rollers to be supplied by the Contractor shall be as shown below unless the Contractor is able to achieve the required density, surface texture, and smoothness with fewer rollers.

Plant Output, t/h	Rollers (minimum)
80	2
120	3
180	4
240	5
300	6

5.4.1.3 Breakdown Rolling. Breakdown rolling shall begin when the asphalt concrete can withstand the mass of the roller without excessive displacement. Delays in rolling will not be tolerated. Rolling shall start longitudinally at the lower side or unsupported edge and proceed towards the centre of the mat, overlapping on each successive pass, by at least one half of the width of the drum. Alternate passes shall be of varying lengths. At unsupported edges, the roller shall cover the edge, but shall not overhang the edge by more than 150 mm.

5.4.1.4 Secondary Rolling. Secondary rolling shall follow the breakdown rolling as closely as possible while the asphalt concrete is still viscous enough to achieve the specified compaction.

5.4.1.5 Final Rolling. Final rolling shall be performed while the asphalt concrete is still viscous enough to permit the removal of roller marks.

5.4.1.6 Vibratory Rolling. Vibratory rollers shall be operated at a travel speed and vibration frequency to produce a minimum of 25 impacts per metre. Vibratory rollers will be used at the low amplitude setting, unless compaction cannot be achieved in which case the high amplitude setting will be used provided it does not cause ripples in the surface. Vibratory rollers shall be equipped with a device to provide for automatic shut off of vibration before the roller comes to a stop.

Vibratory compaction shall not be used on bridge decks.

5.4.1.7 Compaction Near Structures. Along curbs, headers, manholes and other structures not accessible to the roller, compaction must be obtained by employing suitable tampers or compactors.

5.4.2 Surface Finish. The surface, after final rolling shall be smooth and true to the established crown and grade.

All defective areas shall immediately be repaired by removing the asphalt concrete and replacing it with the same type of hot mix asphalt concrete used in that particular lift as per the specifications.

The surface shall be free from roller marks or any depressions exceeding 6 mm when measured with a 3 m straight edge held parallel to the centerline.

The surface shall have a cross slope of 20 mm/m to 35 mm/m as specified by the Engineer (in areas of normal crown).

5.5 Illumination. Asphalt concrete shall be transported, spread and compacted during daylight hours unless artificial light satisfactory to the Engineer is provided.

5.6 Temperature of Asphalt Concrete. Asphalt concrete exceeding a temperature of 165°C at any point of the operation shall be cause for rejection.

5.7 Co-ordination. All Aspects of the operation shall be co-ordinated such that production, transportation, placing and compaction shall be in a steady and continuous manner.

5.8 Segregation, Damage, Contamination. Segregation, damage or contamination of the asphalt concrete shall not be permitted whether it occurs in the stockpiles, mixing drum, conveyors, silos, surge bins, discharge chute, trucks or spreader or any other equipment. Segregated material shall be removed immediately as soon as it becomes apparent at any stage of the operation. Areas of segregated, damaged or contaminated material shall be removed to the full depth of the lift and repaired, to the satisfaction of the Engineer, at the Contractor's expense.

Equipment shall not be refuelled on the new asphalt concrete.

6.0 QUALITY CONTROL / QUALITY ASSURANCE

6.1 Inspection. The Department will have a representative at the site of aggregate production, at the asphalt plant site and on the road. The Contractor is responsible to provide free and safe access to the site(s) to permit the Department's representative to carry out required duties.

The Contractor shall supply an inspection facility both at the aggregate production site and asphalt plant site for the Department's representative and at the Contractor's expense. The location of this facility shall be close to the plant or production site which allows a clear view of the operation and shall be in an environmentally acceptable area. At the aggregate production site and the asphalt plant site, a reservoir of 100 L. of water suitable for performing tests shall be supplied. At the asphalt plant site an electrical connection will be supplied.

6.1.1 Inspection Quarters - Asphalt Plant.
- outside dimension - 2400 mm x 4270 mm (minimum)
- walls and ceiling to be insulated
- one 920 mm door with window and lock
- two windows, (minimum 700 mm x 600 mm) shall open

Furniture, Equipment, Utilities
- one air conditioner
- base board heat
- electricity capable of supporting electronic equipment, air conditioning unit, heat, ignition oven (30 amp 220 volt) etc.
- exhaust fume hood for ignition oven
- two overhead lights
- one sink draining into holding tank
- one bench A along 4270 mm wall -- dimension 760 mm wide by 900 mm high. One bench B along 2400 mm wall - dimension 760 mm wide by 900 high (shall be of sturdy construction and well supported).
- five wall plugs - three plugs located on bench A and two plugs on bench B
- steps providing safe access
- supply of water for testing purposes (not necessarily to be running water)
- two chairs

6.1.2 Inspection Quarters - Aggregate Production Site.
- outside dimension 2 m x 2 m minimum
- one door
- one window
- one bench
- one chair
- supply of water for testing purposes

6.2 Sampling and Testing of Aggregate.

6.2.1 Minimum Production Prior to Sampling. The Department will sample and test the proposed sources according to ASTM D 75 after 1000 t of aggregate have been stockpiled (500 t of coarse and 500 t of fine) ASTM C 136 and ASTM D 546.

6.2.2 Testing During Production. In pits where aggregate is being produced during construction, the aggregate shall be continuously sampled and tested according to ASTM D 75, ASTM C 136 and ASTM D 546.

6.2.3 Testing Stockpiled Aggregate. In high volume operations such as in a quarry where at least 3000 t of stockpile already exist, the aggregate in the stockpile shall be sampled and tested as per ASTM D 75, C 136 and D 546.

6.2.4 Aggregate Sampling for Stripping Test. Sampling of aggregates for the stripping test shall be as outlined in Subsections 6.2.1, 6.2.2 and 6.2.3.

6.3 Sampling PGAB. All QA samples shall be a minimum size of one litre and shall be taken from the Contractor's storage tank in accordance with ASTM D 140 by the Contractor. An additional set-aside sample shall be taken by the Contractor in the event an appeal test is required. The random number information pertaining to the hot mix tonnage at which the PGAB is required to be sampled shall be supplied by the Department.

The Department will verify the sampling, package and transport all samples (including set-aside samples) for QA testing.

7.0 METHOD OF MEASUREMENT

The Contractor shall, at their expense, provide, install and maintain such approved scales and all suitable facilities as may be required to enable the Engineer to determine accurately the weight of asphalt concrete loaded into each truck.

8.0 BASIS OF PAYMENT

8.1 General. Asphalt concrete will be paid for at the contract unit price per tonne for the Asphalt Concrete actually incorporated and accepted in the work which price shall be full compensation for furnishing of all materials (except the supply of PGAB) blend sand, heating, handling, transporting, mixing, placing and rolling of all materials, the supplying of all equipment, plant, labour and incidentals necessary to complete the work.

The unit price per tonne will be subject to adjustments if specified in the Special Provisions (example smoothness). Aggregate in stockpile will be paid for under the conditions and at the rate indicated in the Special Provisions.

8.2 Hauling of Blend Sand. The hauling of blend sand will be paid for if the blend sand is required when the design procedure contained in Subsection 3.2 has been followed. The amount of blend sand eligible for haul payment shall be the actual percentage of blend sand used on a daily basis, or up to 10%. Haul rates to be paid shall beTPW rates, up to a maximum haul distance of 75 kms. Documentation showing the actual haul rates and distances shall be provided to the Engineer.

9.0 WARRANTY

SECTION 7 - ASPHALT CONCRETE PATCHING

1.0 DESCRIPTION

Asphalt concrete patching shall consist of the supply and placement, by hand or machine, of asphalt concrete under the following conditions:

- Repair or replace asphalt concrete within the limits and to the grade of existing asphalt concrete surface (ie. pot holes, cross-cuts for culverts).
- Correct depressions in the existing asphalt concrete surface in "isolated areas". Isolated areas shall be defined as individual sections less than 300 m^2. (ie. sags, areas of wheel rutting).
- On repaving contracts, match (blend) existing pavement outside the normal edge of roadway to the grade of the new asphalt concrete surface. (ie. driveways but not to include intersections with public roads).
- On paving contracts, match new asphalt concrete surface to the existing pavement outside the normal edge of roadway. (ie. driveways).
- On paving or repaving contracts contracts prior to the application of a leveling or surface course, match the grade of the existing asphalt concrete surface where the match strip is less than 3 m in width. (ie. matching the edge of pavement to new curb or to an additional lane or new ramp).

2.0 REFERENCES

All reference standards shall be current issue or latest revision at the first date of tender advertisement. This specification refers to the following standards, specifications or publications:

- Division 4 Section 1, Emulsified Asphalt
- Division 4 Section 4, Asphalt Concrete-Hot Mixed-Hot Placed

3.0 SUBMISSIONS AND DESIGN REQUIREMENTS

4.0 MATERIALS

5.0 CONSTRUCTION METHODS

Prior to placing the hot mix patching material, the areas of the existing pavement shall be tack coated with RS-1 conforming to Division 4 Section 1.

Asphalt Concrete, Type B, Type B-HF, Type C or Type C-HF conforming to Division 4 Section 4, shall be used for Asphalt Concrete Patching. The Contractor shall place Asphalt Concrete Patching by machine, wherever possible, at the discretion of the Engineer to ensure a smooth, uniform surface after compaction.

6.0 QUALITY CONTROL/QUALITY ASSURANCE

7.0 METHOD OF MEASUREMENT

The quantity of Asphalt Concrete Patching for which payment will be made shall be the number of tonnes of asphalt concrete placed and accepted by the Engineer.

8.0 BASIS OF PAYMENT

Asphalt Concrete Patching will be paid for at the contract unit price per tonne for the Asphalt Concrete actually incorporated and accepted in the work, which price shall be full compensation for furnishing of all materials (except the supply of asphalt cement) blend sand, heating, handling, transporting, mixing, placing, and rolling of all materials, the supplying of all equipment, plant, labour, and incidentals necessary to complete the work.

The Contractor shall, at his own expense, provide, install and maintain such approved scales and all suitable facilities as may be required to enable the Engineer to determine accurately the mass of Asphalt Concrete loaded in each truck.

9.0 WARRANTY

SECTION 14 - SAND SEAL SURFACE TREATMENT

1.0 DESCRIPTION

Sand Seal surface treatment shall consist of applying a liquid asphalt primer covered by a graded sand to either a prepared aggregate surface or a previously sand sealed surface.

2.0 REFERENCES

All reference standards shall be current issue or latest revision at the first date of tender advertisement. This specification refers to the following standards, specifications or publications:

- Division 2 Section 11, Fine Grading
- Division 2 Section 12, Fine Grading
- Division 3 Section 2, Gravel Type 1, 1S and 2
- Division 4 Section 1, Emulsified Asphalt
- Division 4 Section 5, Liquid Asphalt - Primer

3.0 SUBMISSION AND DESIGN REQUIREMENTS

Application rates are stated in the specifications but may be adjusted by the Department based on field experience.

4.0 MATERIALS

4.1 Prime Coat. The primer shall be a liquid asphalt conforming to the requirements of Division 4 Section 5.

4.2 Sand. The aggregate used as a sand cover shall be a clean sand conforming to the following gradation:

Table 4.14.1 - Gradation

Sieve Designation	Cumulative Percent Passing
20 000	100
5 000	65 - 95
315	20 - 70
80	2 - 12

The total clay content of the sand shall not exceed 1.5%.
The moisture content at the time of application shall not exceed 6%.

5.0 CONSTRUCTION METHODS

5.1 Equipment. The contractor shall supply all tools, machinery and equipment required in the execution of all phases of the work.

5.1.1 Pressure Distributor. The pressure distributor shall conform to Division 4 Section 1. The approved pressure distributor used for applying the prime coat shall be capable of spraying closely regulated quantities in a uniform manner over a width, if required, of not less than 3.5 m.

Tank wagons and trucks used for the transportation or application of prime coat shall be equipped with satisfactory thermometers for measuring the temperature of the material to be applied.

5.1.2 Sand Spreader. The approved self-propelled sand spreader shall be capable of applying a continuous uniform quantity of sand at a selected application rate.

The spreader shall be equipped with a rear-mounted hopper designed so that a loaded truck may supply sand to the hopper while being towed by the spreader. The spreader shall also be equipped with a front hopper and an approved means of transferring the aggregate to this hopper from the rear.

Metering gates on the front hopper shall be capable of adjusting the width of spread and obtaining a uniform flow of aggregate across the spread width.

5.2 New Sand Seal. The sand seal surface treatment wok shall be done in the following sequence:

5.2.1 Preparation of Road. The Contractor shall notify the Engineer at least two weeks prior to start of work to allow sufficient time for certain preparatory work to be carried out by maintenance forces. Prior to placing the prime coat, the existing road shall be fine graded and Type 1 Gravel, conforming to Division 3 Section 2 of these specifications, shall be applied at a rate as directed by the Engineer.

Immediately prior to placing the prime, the gravel shall be floated with a grader to provide an open surface to accept the prime.

5.2.2 Prime. Over the prepared gravel surface, asphalt prime shall be uniformly sprayed by a distributor a specified in Division 4 Section 1 of these specifications at a rate of approximately 1900 ml/m^2 to 2700 ml/m^2 depending on the penetration into the gravel surface. The temperature of the prime shall not be less than 30°C nor more than 45°C. The width of the primed surface shall vary as directed by the Engineer depending on the width of the road.

5.2.3 Application of Sand Cover. Following the application of the prime coat, a sand cover shall be uniformly applied with an approved spreader at a rate of approximately 9 kg/m^2 to 11 kg/m^2.

5.2.4 Rolling. Immediately after application of the sand cover, rolling shall commence using a steel wheeled roller. The entire treated area shall receive at least two passes of the roller. The rolling operation shall be completed within 300 m of the spreader. The speed of the roller shall not exceed 10 km/h.

5.3 Sand Reseal. The existing previously sand sealed surface will be patched, where necessary, and made ready for resealing by the Department maintenance forces. The Contractor shall notify the Engineer at least two weeks prior to start of work to allow sufficient time for preparatory work to be carried out.

5.3.1 Prime Coat. Over the previously sand sealed surface, asphalt prime coat shall be applied uniformly at a rate of approximately 1100 ml/m^2 to 1400 ml/m^2 depending on the amount of deterioration of the existing surface. The temperature of the prime shall be not less than 15°C nor more than 50°C. The width of the primed surface shall be sufficient to cover the previous sand seal unless otherwise directed by the Engineer.

5.3.2 Application of Sand Cover. The Sand Cover is the same as detailed in Subsection 5.2.3.

5.3.3 Traffic Control. Traffic shall not be permitted on the primed surface prior to the application of the sand cover. Adequate signing and traffic control persons shall be provided to direct traffic around the work site.

5.3.4 Weather Limitations. Sand Seal shall only be applied on a dry surface at minimum air temperature of 7°C. Work shall not be carried out when, in the opinion of the Engineer, high humidity, dampness or the imminence of rain are not conducive to successful results.

6.0 QUALITY CONTROL / QUALITY ASSURANCE

7.0 METHOD OF MEASUREMENT

8.0 BASIS OF PAYMENT

8.1 Fine Grading. Fine Grading will be paid for in accordance with Division 2 Section 12 of these specifications.

8.2 Type 1 Gravel. Type I Gravel will be paid for in accordance with Division 3 Section 2 of these specifications.

8.3 Prime. Prime shall be furnished by the Contractor. Payment shall be in accordance with Division 4 Section 5 of these specifications with the exception of the unit of payment which will be the kilolitre and not the litre.

8.4 Sand Seal and Sand Reseal. Payment for the supply and application of sand will be at the contract bid price per cubic metre which shall be full compensation for the manufacture, screening, loading, transporting and spreading of the sand and shall include all labour, equipment, plant and incidentals necessary to complete the work.

No compensation, other than the contract bid price shall be made for variations in application rate or for re-treatment of any areas, as required by the Engineer.

9.0 WARRANTY

SECTION 15 - COLD MIX FOR WINTER PATCHING

1.0 DESCRIPTION

Cold mix shall be a plant mixed material composed of crushed aggregate and modified asphalt binders manufactured (dried and mixed through a hot mix plant) and delivered to the Department at various locations by the Supplier.

2.0 REFERENCES

3.0 SUBMISSIONS AND DESIGN REQUIREMENTS

3.1 Mix Requirements. The cold mix shall be capable of maintaining all of its performance features and remain pliable in uncovered stockpiles for a period of one year after delivery.

3.2 Independent Review. Prior to product acceptance the supplier shall provide to the Department records of independent testing for every 500 t of production indicating that the cold mix meets the requirements of this specification.

4.0 MATERIALS

The cold mix shall possess adequate stripping resistance, workability and cohesion as determined by the following tests:

4.1 Stripping Resistance. 50 g of cold mix shall be placed in 400 ml of boiling distilled water in a 600 ml glass beaker. It shall be stirred with a glass rod at one revolution per second for 3 minutes.

The percentage coating retained shall then be visually evaluated. Retained coatings of less than 95% shall constitute failure.

4.2 Workability. This test method covers the determination of the workability property of cold patching material (CPM) in cold temperatures (e.g. at -10°C) by blade resistance. The test method TPW-TM7 describing the procedure is available from the Technical Services Library.

A maximum workability index (W.I.) of 2000 Newtons (N) is required.

4.3 Cohesion. Two, 1200 g samples of cold mix and two standard Marshall molds shall be cooled to 4±1°C. Then place sufficient cooled cold mix material (approximately 800 g) into the cooled standard Marshall molds such that the final compacted height of the samples shall be 63.5 mm high with a diameter of 102 mm. The sample shall be compacted using 5 blows of a standard Marshall hammer (4.5 kg) to each side, from a drop height of 457 mm. The sample shall then be extruded and a record of the mass of the compacted sample kept. The compacted sample shall then be placed along the bottom edge of a 305 mm diameter sieve with a 25 mm nominal opening size while both the sieve and the sample are standing on end. The cover shall be placed on the sieve while it is still on end. The sieve shall then be rolled with the sample inside back and forth 20 times, taking approximately 1 second for each of the 20 passes. Laying the sieve against the edge of a table for ten seconds, allow time for sample pieces to fall through the sieve openings. Then flip the sieve and lid over so that the sample in the sieve falls onto the lid and weigh the material retained. Determine the average percentage retained by dividing the weight retained by the original weight.

A minimum retention value of 60% is required.

5.0 CONSTRUCTION METHODS

5.1 Placement. The cold mix shall be placed in potholes (which may or may not be filled with water).

5.2 Compaction. The cold mix will normally be compacted by rolling with truck tires, allowing for a crown of between 3.2 mm and 6.4 mm.

6.0 QUALITY CONTROL / QUALITY ASSURANCE

6.1 Department Testing. Prior to product acceptance the Department may request the supplier to provide samples of the cold mix to be tested by the Department or its representative.

6.2 Stockpile Sampling and Testing. The cold mix may be sampled randomly from stockpile by the Department or its representative. Failure to conform to specification requirements shall result in product rejection.

6.3 Field Performance. The cold mix shall not rut or ravel out of potholes for a period of six months after placement. Failure to conform to specification requirements shall result in product rejection.

6.4 Disposal of Rejected Material. Rejected material shall be weighed and removed from Department facilities at the Supplier's expense.

6.5 Replacement of Rejected Material. All rejected material shall be replaced with material conforming to specification by the supplier and delivered to the Department facilities, all at the suppliers expense.

7.0 METHOD OF MEASUREMENT

The Contractor shall, at their own expense, provide, install and maintain such approved scales and all suitable facilities as may be required to enable the Engineer to determine accurately the weight of asphalt concrete loaded into each truck.

8.0 BASIS OF PAYMENT

Cold mix will be paid for at the contract unit price per tonne which shall be full compensation for the furnishing of all materials (including the asphalt cement) including handling, mixing, weighing and transporting to Department depots of cold mix to meet the requirements as herein specified.

9.0 WARRANTY

9.1 Security Deposit. Notwithstanding anything to the contrary, as stated in Division 1 Section 3 Subsection 6 of these specifications, the security deposit for this contract will be held and retained by the Minister for one year after final delivery of the product. The security deposit will be held to ensure that sufficient funds will be available to the Department in the event of non-performance by the Contractor. The amount of security deposit shall be approximately 10% of the estimated value of the tender.

SECTION 16 - MICRO-SURFACING - (EPWS)

1.0 DESCRIPTION

Micro-surfacing shall include both surface and rut fill application unless otherwise specified.

Micro-surfacing shall consist of the maintenance and application of a homogeneous mixture of cationic polymer modified emulsified asphalt, mineral aggregate, mineral filler, water and other additives to the existing pavement surface.

2.0 REFERENCES

All reference standards shall be current issue or latest revision at the first date of tender advertisement. This specification refers to the following standards, specifications or publications:

- ASTM D36, Test Method for Softening Point of Bitumen
- ASTM D244, Test Methods for Emulsified Asphalts
- ASTM D2170, Test Method for Kinematic Viscosity of Asphalts
- ASTM D2397, Specification for Cationic Emulsified Asphalt
- ASTM D2419, Test for Sand Equivalent Value of Soils and Fine Aggregate
- ASTM E303, Method of Measuring Surface Frictional Properties Using British Pendulum Tester
- ISSA TB-100, Wet Track Abrasion Loss
- ISSA TB-109, Excess asphalt by LWT Sand Adhesion
- ISSA TB-113, Mix Time
- ISSA TB-114, Wet Stripping
- ISSA TB-139, Wet Cohesion
- ISSA TB-144, Classification Compatibility
- ISSA TB-147A, Lateral Displacement
- Division 1 Section 3 Subsection 6, Agreement
- Division 1 Section 4 Subsection 25, General Provisions
- DOT&PW Traffic Control Manual
- Federal Department of Consumer and Corporate Affairs

3.0 SUBMISSIONS AND DESIGN REQUIREMENTS

3.1 Mix Design. The Contractor shall designate the mix proportions and prepare the job mix formula. The aggregate and the polymer modified emulsified asphalt shall be assessed to confirm compatibility. The Contractor shall supply the results of a sand equivalency test for the aggregate.

All component materials used in the mix design shall be representative of the material proposed by the Contractor for use on the contract.

The Contractor shall submit to the Department the final mix design and the results of the tests listed in Table 4.16.1. The material shall not be placed until the Engineer has received the mix design.

Table 4.16.1 - Micro-Surfacing Mix Properties

Test Name	Standard	Requirement
Wet Cohesion @ 30 minutes min. (Set)	ISSA TB-139	Minimum 12 kg-cm
Wet Cohesion @ 60 minutes min. (Traffic)	ISSA TB-139	Minimum 20 kg-cm
Excess Asphalt by LWT	ISSA TB-109	Maximum 538 g/m^2
Wet Stripping	ISSA TB-114	Pass (90% min)
Wet Track Abrasion Loss, 1 Hour Soak	ISSA TB-100	538 g/m^2
Wet Track Abrasion Loss, 6 Day Soak	ISSA TB-100	807 g/m^2
Lateral Displacement	ISSA TB-147A	Maximum 5
Classification Compatibility	ISSA TB-144	AAA, BAA 11 Grade Points Min.
Mix Time @ 25°C	ISSA TB-113	Controllable to 120 Sec. Min
Sand Equivalency	ASTM D2419	65 Min

The micro-surfacing shall be designed so that traffic can be allowed on the surface within one hour.

4.0 MATERIALS

4.1 Polymer Modified Emulsified Asphalt (Binder). The binder shall be a quick set polymer modified cationic type CSS-1H emulsion or equivalent.

Emulsified asphalt and polymer modified asphalt shall be homogeneous after mixing and show no signs of separation within 14 days of delivery. The addition of polymers or other additives after the manufacture of the emulsified asphalt shall not be permitted.

The binder shall conform to the requirements of ASTM D 2397 for an emulsion, with the following amendments as detailed in Table 4.16.1.

Table 4.16.2 - Polymer Modified Emulsified Asphalt

Test Name	Standard	Requirement
Residue by Distillation, % by Mass	ASTM D244	Minimum 62%
Tests on Residue		
Softening Point	ASTM D36	Minimum 57°C
Penetration, (25°C, 100 g, 5 s), 0.1mm	ASTM D2397	40 - 90
Kenematic Viscosity @ 145°C	ASTM D2170	Minimum 650 mm^2/s

4.2 Aggregates. The aggregates shall consist of 100% crushed bedrock material.

4.2.1 Stockpiling. The Contractor shall construct stockpiles at sites of his own choosing. Such sites shall be arranged for, and shall be the responsibility of the Contractor, in all respects. Throughout the duration of the work there shall be sufficient aggregate in stockpile to cover three days production. If different sources of aggregate are to be used, separate stockpiles for each source are to be maintained.

The aggregates shall conform to the gradation requirements as detailed in Table 4.16.3.

Table 4.16.3 - Aggregate Gradation

Sieve Designation	Cumulative Percent Passing	Stockpile Tolerance, %
10 000	100	± 5
5 000	70-90	± 5
2 500	45-70	± 5
1 250	28-50	± 5
630	19-34	± 5
315	12-25	± 4
160	7-18	± 3
80	5-15	± 2

Once the gradation for the mix design has been submitted, the stockpile shall be within the tolerances shown under Stockpile Tolerances.

4.2.2 Sampling. The Department reserves the right to sample stockpiles to ensure the gradation conforms to that used in the mix design.

4.3 Mineral Filler. Mineral filler shall be free of lumps and shall not be air entrained.

4.4 Water. The water shall be potable and shall be free of harmful salts and contaminants.

4.5 Polymer Modifier. The polymer solids, along with special quick setting emulsifier agents shall be milled into the emulsified asphalt at the colloid mill.

The polymer modifier shall consist of a minimum of 3% polymer solids by mass.

4.6 Additives. Additives may be added to the emulsion mix during construction to provide control of the quick-set properties and increase adhesion. They must be compatible with the other components of the micro-surfacing.

5.0 CONSTRUCTION METHODS

5.1 General

5.1.1 Weather Limitations. The Contractor shall be responsible for determining under what weather conditions work on this contract may proceed. The

Department, however, reserves the right to direct the Contractor to discontinue micro-surfacing operations when, in the opinion of the Engineer or selected representative, weather conditions endanger the traveling public.

5.1.2 Documentation. The Contractor shall submit to the Engineer, at the beginning of each working day, a written summary of the total quantity and distribution rate of micro-surfacing placed the previous day which shall include a list of the quantities used of each of the components; aggregate, emulsion, cement and additive.

5.1.3 Protection of Work and Traffic Control. The Contractor shall be responsible for providing traffic control required to protect the work zone and to ensure the safe passage of traffic in conformance with the DOT&PW Traffic Control Manual or as directed by the Engineer. Traffic control shall include traffic control persons, pilot vehicles with operators, signing and all other labour, equipment and material, excluding the supply of signs.

The Contractor shall be responsible for ensuring that the mixture is not damaged by traffic.

Traffic, including construction traffic, shall be kept off the freshly placed mixture for whatever time is required to prevent damage to the surface and until premarking of traffic lines with paint is complete.

5.1.4 Trial Area. At the commencement of the micro-surfacing operation the Contractor shall demonstrate the ability to produce and place micro-surfacing by placement of a trial area 100 m in length and one lane in width.

5.1.5 Appearance. The finished micro-surfacing shall have a uniform texture free from excessive scratch marks, tears or other surface irregularities. Tear marks in any 12 m^2 per-lane are considered excessive if there are:

- four or more marks 12 mm wide or wider and 100 mm or more long;
- any marks 25 mm wide or wider and 25 mm or more long.

There shall be no longitudinal ripples (raking) and wash-boarding (chatter) of 5 mm or more in depth as measured with a 3 m straight edge, or other irregularities that will affect the ride quality.

The edges of the micro-surfacing for surface application shall be uniform with neat appearance along the roadway centerline, lane lines, shoulder, pavement edge, and curb lines. Edges shall have no more than ± 50 mm horizontal variance in any 30 m section.

The finished surface shall be uniform and achieve a minimum British Pendulum Number (PDN) of 45 as measured with the British Pendulum Tester in accordance with ASTM E 303.

5.1.6 Joints. The longitudinal and traverse joints shall be neat and uniform in appearance. No excessive buildup, uncovered areas, non-homogeneous mixture or unsightly appearance shall be permitted on longitudinal or transverse joints.

The longitudinal joints in the scratch coat shall be constructed as a butt joint. The longitudinal joints in the surface course shall be placed on lane lines with less than 100 mm overlap on adjacent passes, except where pavement width varies ie. ramps and tapers, and no more than 6 mm difference in elevation between the adjacent passes as measured with a 3 m straight edge.

Transverse joints shall be constructed with no more than 6 mm difference in elevation across the joint as measured with a 3 m straight edge.

5.2 Equipment.

5.2.1 Brooms. Power brooms shall be capable of cleaning gravel, sand, dirt and other debris from bituminous surfaces shall be used.

5.2.2 Mixing Equipment. The machine shall be specifically designed and manufactured to place micro-surfacing. The material shall be mixed by an automatic sequenced, self-propelled micro-surfacing mixing machine, which shall be a continuous flow mixing unit, able to accurately deliver and proportion the aggregate, emulsified asphalt, mineral filler, control setting additive, and water to a revolving multi-blade double shaft mixer and discharge the mixed product on a continuous flow basis. The machine shall have sufficient storage capacity for aggregate, emulsified asphalt, mineral filler, control additive and water to maintain an adequate supply to the proportioning controls.

5.2.3 Proportioning Devices. Individual volume or weight controls for proportioning each material to be added to the mix (ie. aggregate, mineral filler, emulsified asphalt, additive, and water) shall be provided and properly marked. These proportioning devices are usually revolution counters or similar devices and are used in material calibration and determining the material output at any time.

5.2.4 Calibration of Proportioning Devices. Prior to beginning placement of micro-surfacing, the Proportioning Devices shall be calibrated. A copy of the results of the calibration must be given to the Engineer prior to any micro-surfacing operation.

Over the duration of the work, the Proportioning Devices shall be re-calibrated, should the following occur:

- After every 2000 t of aggregate placed throughout the duration of the contract.
- A change in the source of aggregate from that used in the previous calibration.
- Mechanical failure to the application system and/or Proportioning Devices in which repair is required.

5.2.5 Straight Edges. A 3 m straight edge shall be available that may be used to check for cross fall.

5.2.6 Spreading Equipment. The mixture shall be spread uniformly by means of a conventional augured surfacing spreader box attached to the mixing machine and equipped with paddles to agitate and spread the material evenly throughout the box. A front seal shall be provided to ensure no loss of the mixture at the pavement contact point. The rear seal shall act as final strike-off and shall be adjustable. The spreader box and rear strike-off shall be so designed and operated that a uniform consistency is achieved to produce a free flow of material to the rear strike-off. The spreader box shall have suitable means provided to maneuver the box to compensate for variations in the pavement geometry.

The rut filling spreader box shall be specifically designed for rut filling applications.

5.2.7 String line. A String line or other device must be provided to ensure the longitudinal edges are straight and meet the existing pavement edge or as directed by the Engineer.

5.3 Construction Sequence

5.3.1 Surface Preparation. The area to be surfaced shall be thoroughly cleaned of all vegetation, loose material, sand, dirt and other debris. Dried mud or other foreign matter, which cannot be removed with the rotary power broom, shall be removed by hand blade or other approved method. Water, if required, shall be applied to pre-wet the surface and immediately ahead of the spreader at a rate to dampen the surface without allowing any freestanding or free flowing water.

5.3.2 Tack Coat The area to be surfaced shall be covered with tack coat. The tack coat should consist of one part cationic polymer emulsified asphalt and three parts water and will be applied with a standard distributor. The distributor shall be capable of applying *the dilution evenly at a rate of 0.16 to 0.32 litres per* square metre. The tack coat shall be allowed to cure sufficiently before the application of Micro-Surfacing.

5.3.3 Application. The mixture shall be spread to fill minor cracks and shallow potholes and leave a uniform surface. The application shall consist of a scratch coat and a surface coat with a combined minimum application rate of 14 kg/m^2.

Existing ruts greater than 10 mm shall be filled by separate application of micro-surfacing, with a rut filling spreader box, prior to the surface application.

Rut Fill Only application shall be specified where only the rut is to be filled with no surface application to follow. The mixture shall be confined to the immediate area of the rutting or as directed by the Engineer. Edges shall be feathered to blend into the existing cross slope.

Filled ruts shall have no depression. Overfill of ruts shall not exceed 3 mm per 25 mm of rut depth filled as measured with a 3 m straight edge.

For both types of application a sufficient amount of mixture shall be carried in all parts of the spreader box at all times so that complete coverage is obtained. Water may be sprayed into the spreader box to facilitate spreading without harming the mix. No lumping, balling, or unmixed aggregate shall be permitted in the finished surface. Any oversized aggregate or foreign materials shall be screened from the aggregate prior to delivery to the mixing machine.

5.3.4 Handwork. In restricted areas where hand spreading is necessary, slight adjustments to the mix formula may be used to retard the setting time. The mixture shall be poured into a small windrow along one edge of the surface to be covered. The mixture shall be spread uniformly with squeegees or other suitable hand tools.

5.3.5 Rolling. The micro-surfacing shall be rolled at the discretion of the contractor.

5.3.6 Clean-Up. All areas, such as shoulders and gutters, shall have the micro-surfacing mix removed as specified by the Engineer. The Contractor shall, on a daily basis, remove any debris associated with the performance of the work.

6.0 QUALITY CONTROL / QUALITY ASSURANCE

6.1 Quality Control. Quality control testing shall be the responsibility of the Contractor throughout every stage of the work, from and including, the production of the aggregates and polymer modified asphalt emulsion to the design and placement of the final product.

The Contractor shall provide the Engineer with a copy of all quality control test results within 24 hours of testing.

6.2 Quality Assurance. During the progress of the work, quality assurance testing may be conducted by the Department or its representative to ensure compliance with the specifications.

Results of the Quality Assurance testing will be available to the Contractor within 24 hours.

Quality Assurance testing performed by the Department or its representative shall not be considered to be quality control testing. Sampling and testing necessary to perform quality assurance monitoring will be at no cost to the Contractor.

7.0 METHOD OF MEASUREMENT

The method of measurement and payment shall be based on the area covered, measured in square metres.

8.0 BASIS OF PAYMENT

8.1 Micro-Surfacing. Payment for this item will be at the contract unit price per square metre of surface application.

Payment shall be full compensation for the supply, handling, transporting, mixing and placing of all materials, including tack coat and rut filling, the supplying of all equipment, plant, labour, incidentals and traffic control necessary to complete the work.

9.0 WARRANTY

9.1 Initial Acceptance. Initial acceptance of the work will be made provided all of the following conditions are met:

9.1.1 Bleeding and Flushing. The total of areas exhibiting bleeding and flushing shall not exceed two percent in any 100 m^2 area. No bleeding at the joints shall be permitted.

9.1.2 Surface loss (debonding, delamination and/or potholing). The total of areas exhibiting loss of surface shall not exceed two percent in any 100 m^2 area.

9.1.3 Raking and Chatter. The total of areas exhibiting raking and chatter shall not exceed two percent in any 100 m^2 area.

9.1.4 Ruts. The total of areas exhibiting ruts exceeding 6 mm below grade, as measured with a 3 m straight edge, shall not exceed two percent in any 30 m lane segment. The warranty period for rutting shall be sixty (60) days after placement has been accepted by the Engineer. The warranty period shall apply to both initial placement and repairs.

9.1.5 Surface Friction. At the end of the maintenance period the surface shall have a uniform texture and a minimum BPN of 45 as measured with the British Pendulum Tester in accordance with ASTM E 303.

9.2 Maintenance / Repair Period

Upon completion of the Micro-Surfacing and visual acceptance of the work in accordance with these specifications, a two year maintenance period will begin. During this period any failure in the Micro-Surfacing, including but not limited to raking, chatter, raveling, potholes, delamination, debonding, over rich or bleeding areas shall be repaired or reconstructed at the Contractor's expense to the satisfaction of the Engineer. Any 400 m lane segment that has defects exceeding five percent of the area shall require a reapplication of micro-surfacing over the entire segment. All material, haul and related work required for reconstruction of unacceptable areas shall be paid by the Contractor.

At the discretion of the Engineer, any failure in the Micro-Surfacing within the first 12 months of the maintenance period, deemed to be a hazard to traffic, shall be repaired by the Contractor immediately.

9.3 Final Acceptance. The Department or its representatives, and the Contractor will meet and inspect the Micro-Surfacing prior to the expiration date of the two year maintenance period.

Based on the aforementioned criteria for initial acceptance, if the Contractor and the Department do not agree on what areas are failed, the Department's decision shall be final. All areas that have failed shall be repaired at the Contractor's expense at no cost to the Department.

The final acceptance of the original Micro-Surfacing by the Department shall relieve the Contractor from all maintenance responsibility with respect to the original Micro-Surfacing, however, the Contractor shall be held responsible to maintain repaired areas for a period of 12 months after repairs are made.

9.4 Liability. During the period of construction and the two year maintenance period the Contractor shall be responsible for processing any and all claims for property damage and/or bodily injury caused by failure of the Micro-Surfacing including but not limited to motor vehicle or pedestrians. The Contractor shall be responsible for the payment of all property damage and bodily injury claims and agrees to save and hold harmless the Department from all such claims as set out in Division 1 Section 4 Subsection 25 of these specifications. Claims not handled by the Contractor or representative efficiently or expediently will be settled by the Department and the costs recovered from the Contractor.

9.5 Security Deposit. Notwithstanding anything to the contrary, and as stated in Division 1 Section 3 Subsection 6 of these specifications, the security deposit for this contract shall be held and retained by the Minister until the maintenance period has expired. The security deposit will be held to ensure that sufficient funds will be available to the Department in the event of non-performance by the Contractor who is responsible for all costs including the materials and haul and for the repair of all failures and damages resulting from negligence or faulty workmanship by the Contractor that adversely affects the integrity of the Micro-Surfacing which occurs and is evident prior to the expiration of the two year maintenance period. The amount of security deposit shall be approximately 20% of the estimated value of the tender.

SECTION 7 - CAST IN PLACE CONCRETE

1.0 DESCRIPTION

This section details the requirements for materials and methods in the proportioning, mixing, transport, placement, finishing and inspection of cast in place Portland Cement Concrete (PCC).

2.0 REFERENCES

All reference standards shall be current issue or latest revision at the first date of tender advertisement. This specification refers to the following standards, specifications or publications:

- ANSI/ACI 117, Tolerances for Concrete Construction and Materials
- ASTM C 260, Air-Entraining Admixtures for Concrete
- ASTM C 309, Specification for Liquid Membrane-Forming Compounds for Curing Concrete
- ASTM C 494, Chemical Admixtures for Concrete
- ASTM C 1064, Temperature of Freshly Mixed Portland Cement Concrete
- ASTM D 1751, Preformed Expansion Joint Filler for Concrete Paving and Structural Construction
- CGSB 37.2-M, Emulsified Asphalt Mineral Colloid Type Unfilled for Damp-Proofing, Water-Proofing and for Roof Coatings
- CGSB 37.3-M, Application of Emulsified Asphalts for Damp-Proofing or Water-Proofing
- CSA A5, Portland Cement
- CSA A23.1, Concrete Materials and Methods of Concrete Construction
- CSA A23.2, Methods of Test for Concrete
- CSA A23.5, Supplementary Cementing Materials
- CSA A362, Blended Hydraulic Cement
- CSA S269.3, Concrete Formwork
- Drawing HS504.DWG
- Drawing HS505.DWG
- Drawing HS506.DWG
- Drawing HS529.DWG

3.0 SUBMISSIONS AND DESIGN REQUIREMENTS

3.1 Formwork and Falsework. One copy of drawings and design calculations for Formwork and related Work bearing a Registered Professional Engineer's seal shall be submitted by the Contractor to the Engineer for review at least four (4) weeks before construction. The submission is intended for information purposes only and shall in no way relieve the Contractor of full responsibility to carry out work related in accordance with CSA S269.3 for Concrete Formwork and CSA S269.1 for Falsework.

3.2 Notification of Ready Mix Supplier. At least two weeks in advance, the Contractor shall advise the Engineer of the qualified Ready Mixed Concrete Supplier which they propose to use. The Engineer will verify the acceptability of the Supplier and the mixture designs. Acceptance of the Supplier and the mixture designs by the Engineer does not relieve or reduce the responsibility of the Contractor or Supplier from the requirements of the specification.

3.3 Advance Qualification of Ready Mixed Concrete Suppliers. The Contractor shall recognize that the Department may qualify in advance, as detailed below, Ready Mixed Concrete Suppliers, however, the Department bears no responsibility for said advance qualification. Liability for the product supplied shall be the sole responsibility of the Contractor.

Ready Mixed Concrete Suppliers may become qualified prior to supplying concrete to Department projects. Qualification may be obtained by submitting current relevant acceptance test data and concrete mixture designs, typically specified for Cast in Place Concrete, to the Department for review prior to the first day of December. Current relevant acceptance test data is defined as data which has been obtained within ninety days prior to the first day of December. The Department will maintain a list of qualified Ready Mixed Concrete Suppliers including their concrete mixture designs. Ready Mix Concrete Suppliers who become qualified in the month of December, shall remain qualified to the thirty first day of December of the following year.

3.3.1 Required Test Information. The Ready Mixed Concrete Supplier shall provide relevant test data for all materials indicating conformance to the requirements of CSA-A23.1 and this specification. The sources and test results of all materials shall be clearly identified. The aggregate tests shall be conducted by a testing laboratory, approved by the Department, under the direction of a Professional Engineer registered to practice in Nova Scotia. Test data required shall include, but not be limited to:

- portland cement
- blended hydraulic cement (if used)
- supplementary cementing materials
- admixtures
- water
- aggregates

Aggregate testing shall consist of:

- Sieve Analysis(1) of Fine and Coarse aggregate
- Amount of Material Finer(1) Than 80 μm in Aggregate

- Bulk Relative Density and Absorption of Fine and Coarse Aggregate (SSD basis)
- Fineness Modulus[1] of Fine Aggregate
- Clay Lumps and Light Weight Pieces
- Test for Organic Impurities in Fine Aggregate
- Flat and Elongated Particles in Coarse Aggregates
- Petrographic Analysis of Coarse Aggregate (PN - NS Test Method)
- Resistance to Degradation of Coarse Aggregate by Abrasion and Impact in the Los Angeles machine
- Micro-Deval test for Fine Aggregates
- Soundness of Coarse & Fine Aggregate by Use of Magnesium Sulphate
- Test for Detection of Alkali-Aggregate Reactivity (AAR) on Coarse Aggregate (every 2 years).

[1] Prior to the first concrete placement, a washed sieve analysis shall be conducted on each proposed stockpiled aggregate at the ready mix plant, representative of the materials to be used in the work and the results submitted to the Engineer by the Contractor.

3.3.2 Certification and Membership. The Ready Mixed Concrete Supplier shall provide current plant certification and membership certificates issued by the Atlantic Provinces Ready Mixed Concrete Association (APRMCA).

3.4 Ready Mix Concrete Suppliers (Not Qualified in Advance). In the event that the Contractor selects a Ready Mixed Concrete Supplier not qualified in advance by the Department, the Contractor shall, within 4 weeks prior to starting concrete work, submit to the Engineer all of the required information detailed in Subsection 3.3 of this section. The Engineer will verify the acceptability of the Supplier and the mixture designs. Ready Mix Concrete Suppliers who become qualified after January first, shall remain qualified to the thirty first day of December in the same calendar year.

4.0 MATERIALS

4.1 General. All materials used in the production of concrete shall conform to the referenced standards.

4.2 Formwork. Formwork shall be constructed from lumber devoid of warp and defects in order to achieve a face alignment free from distortion. This shall apply to all panel forms including prefabricated boards, plywood and steel panels. Prior to assembly and placement of reinforcing steel all forms and panels shall be treated with a non-staining, non-reactive mineral oil or liquid, as approved by the Engineer. Patching shall be kept to a minimum.

Formwork shall be supported by shores to sustain all horizontal and vertical loads during placing of the PCC.

Column forms shall be seamless heavy gauge galvanized steel and/or fibre column molds.

4.3 Concrete Mixture Designs

4.3.1 Proportioning. Concrete mixtures shall be proportioned in accordance with CSA A23.1, Alternative #1, and the Contractor shall accept responsibility for concrete strength. The physical properties for various structural elements are identified in Table 5.7.1 of this specification. Fly ash and/or silica fume may be used, however, the Department reserves the right to limit their proportion to 20% and 10% respectively in the mix.

4.3.2 Mix Proportions. The Ready Mixed Concrete Supplier shall select mix proportions that shall produce concrete of specified quality, yield and strength complying with Alternative #1 CSA-A23.1, and Table 5.7.1 of this specification. Typical mixture designs include, but are not limited to:

- 20 mm 25 MPa
- 20 mm 30 MPa
- 20 mm 32 MPa
- 20 mm 35 MPa

A report outlining the proposed mixture designs shall be signed by a Professional Engineer registered to practice in Nova Scotia. The Professional Engineer shall attest to the validity of the material test data stated in Subsection 3.3. Mix designs incorporating alkali reactive aggregate shall be adjusted to limit excessive expansions.

4.3.3 Changes to Mixture Designs or Material Properties. If material characteristics change after the Ready Mixed Concrete Supplier becomes qualified, the Contractor shall provide physical properties and certified test results as indicated in Subsection 3.3 of this specification. In the event mixture designs are modified without changing material characteristics, the revised mixture designs shall be submitted to the Engineer.

4.3.4 Concrete Mix Specifications. The mix design specifications can be found in Table 5.7.1

Table 5.7.1 - Concrete Mixture Design Specifications

Element	Footing	Leveling Slab	Tremie	Roadway Curbs & Sidewalks, Jersey Barrier, Driveway Entrances, Abutment, Wingwall, Slope Protection, Culvert, Road Drain, Sign Base	Bridge Deck Sidewalk, Curb, Parapets, End Posts, Backwall, Beam Seat, Column, Pier Cap
Maximum Nominal Aggregate, mm	40	20[1]	20	20	20
Minimum 28 Day Compressive Strength, MPa	30		30	32	35
Maximum Water/cementing Material Ratio	0.50		0.45	0.45	0.40
Minimum Cementitious Content kg/m³[2]	300		390	350	415
Air Content, %	6 ± 1		6 ± 1	6 ± 1	6 ± 1
Slump, mm	80 ± 20		170 ± 30	80 ± 20[4]	80 ± 20
Required Admixtures[3]	Water Reducer, Air Entrainment				

[1] Either aggregate size may be utilized unless otherwise specified.

[2] Portland Cement shall be Type 10 Normal unless otherwise specified.

[3] Other admixtures such as Retarders, Accelerators or Superplasticizers may be used if approved by the Engineer.

[4] Lower slump may be required when a slip form machine is used to place concrete.

4.4 Aggregate Specification. The maximum Petrographic Number of coarse aggregate shall not exceed 140. The maximum absorption of coarse aggregate shall not exceed 2%.

4.5 Curing Compounds. Membrane curing compound shall be white pigmented Type 2, meeting the requirements of ASTM C309.

4.6 Damp-Proofing. All damp-proofing material shall conform to CAN/CGSB-37.2-M and shall be applied in accordance with CGSB-37.3.

5.0 CONSTRUCTION METHODS

5.1 Formwork Design. Formwork design and the proposed method of construction shall meet all necessary requirements in terms of strength and properties of material, rigidity and erection tolerances as presented in Subsection 5.1 of this specification.

Formwork shall be built with sufficient strength and rigidity to carry the mass or fluid pressure of the PCC as well as all construction loads including wind, equipment and runways which might be placed upon them. The fluid pressure on forms shall be correlated to the capacity and type of placing equipment, the rate of placing, slump and temperature of the PCC.

Formwork shall be supported by stiff members in two directions at right angles which are sufficiently rigid to hold the unit as a whole in line and in proper position and shape. Formwork shall be accurately located, rigidly tied or braced to resist vertical or horizontal movements and adequately supported. However, they shall be so arranged to allow for easy stripping to prevent damage of the PCC during removal. The use of twisted wires and wood spreaders are prohibited unless approved by the Engineer.

5.1.1 Formwork/Falsework Construction. The Contractor shall construct the falsework and formwork in accordance with the approved drawings. Variations from the drawings shall not be permitted unless such variations are approved by the Designer, and the Engineer is provided with revised drawings prior to construction. Both the falsework and formwork shall be designed and constructed to provide the necessary rigidity and to support the loads without settlement or excessive deflection.

All falsework and formwork used to support fresh concrete during construction of the following components shall be designed by a Registered Professional Engineer in accordance with CSA S269.3:

- bridge decks and pier caps
- columns over 3 m in height
- retaining walls over 3 m in height
- roofs of structures under which persons are required to work
- as required on the contract drawings

5.1.2 Construction Joints. The locations and details of vertical construction joints not indicated on the drawings shall be submitted by the Contractor to the Engineer for his approval. PCC in piers and abutments shall be placed without horizonal construction joints unless previously approved by the Engineer.

5.1.3 Removal/Re-Use of Formwork and Falsework. Formwork and falsework shall not be removed without the approval of the Engineer.

All formwork and falsework shall be completely removed from the structure. Formwork shall be removed progressively and with care so that corners of PCC members are not damaged or marred.

The time of removal of the falsework shall be determined by the strength and curing requirements of the concrete and the ability of the structure to carry its own dead load and any live or construction load that may be placed on it. Where field operations are controlled by beam or cylinder tests, the formwork and falsework may be removed when the PCC has reached the required strength as determined by the Engineer

Formwork material intended for re-use shall be clean and in satisfactory condition. Formwork shall not be re-used without the Engineer's approval.

5.1.4 Formwork Tolerances. The following tolerances in Table 5.7.2 are permitted for lines, grades or dimensions shown on the contract drawings:

5.2 Concrete Production. Concrete shall be produced at a stationary or portable plant. Concrete shall not be supplied to any Department project unless the Ready Mixed Concrete Supplier is qualified by the Department and so designated.

5.2.1 Mixing and Transporting. The concrete materials shall be mixed and transported in a manner which will not segregate or damage the mix in any fashion. Concrete shall be mixed utilizing stationary or truck mixers. The mixer shall carry the Manufacturer's rating plate in a prominent position, indicating:

- the gross volume of the mixer
- the rated maximum mixing capacity
- the minimum and maximum speeds for mixing and agitating of the mixer

Table 5.7.2 - Formwork Tolerance

Variation From Contract Drawings	Tolerance
(I) For plumb or specified batter at columns, piers and walls	12 mm in 3 m for Exposed area 25 mm in 3 m for Backfilled area
(II) For level or specified grade in slabs, beams, horizontal groves, railing offset, etc.	12 mm in 3 m for Exposed area 25 mm in 3 m for Backfilled area
(III) X-Sectional dimensions for Piers, Columns, Beams, slabs, walls, etc.	No more than 12 mm No less than 6 mm
(IV) Bridge Deck Thickness	No more than 6 mm No less than 3 mm
(V) Footing Length & Width	No more than 50 mm No less than 12 mm
(VI) Footing thickness	minus 5% of the specified thickness

All mixers shall be capable of combining the concrete ingredients into a thoroughly mixed and uniform mass. In no case shall the mixer loading exceed its rated maximum mixing capacity.

Mixers shall be emptied before charging. The mixer shall be rotated at the Manufacturer's recommended mixing speed during charging and mixing.

Where ready mix trucks are used to transport the concrete, the Department reserves the right to subject any truck suspected of poor mixing to a uniformity test as outlined in CSA A23. If said truck fails the uniformity test, then the concrete and the truck shall be rejected unless otherwise directed by the Engineer. The truck shall not be permitted on a Department site until appropriate repairs have been completed and certified.

5.3 Form Preparation/Concrete Placement. The

Contractor shall provide the Engineer with at least 24 hours notice of intent to place concrete in order to permit the Engineer to schedule inspection services. All PCC placing methods shall be subject to the approval of the Engineer.

In preparation for the placing of concrete, all sawdust, chips, construction debris and other deleterious materials shall be removed from the interior of forms. The PCC shall be delivered to the point of final deposit in a manner satisfactory to the Engineer using means and equipment which will prevent segregation or loss of materials. The size of section to be placed in one continuous operation shall be as detailed on the drawings or as directed by the Engineer. PCC for deck slabs shall not be placed between November 15 and April 15, without the written approval of the Engineer.

Unless otherwise authorized by the Engineer, forms shall be kept dry during the placing of the PCC until the PCC has reached initial set. The Contractor shall be held responsible for the placing method used. PCC shall be deposited in the forms in maximum lifts of 500 mm and in layers that are approximately horizontal and as close as practicable to its final position. PCC shall not be moved horizontally with vibrators or by other methods which could cause segregation.

The conveying equipment shall be kept free from deleterious materials and cleaned at frequent intervals. Conveying equipment, if supported by formwork, shall not impart harmful vibration to PCC nor cause misalignment of forms.

Under adverse weather conditions the Contractor shall be prepared to provide suitable protection in order to prevent damage to PCC.

Unless otherwise authorized by the Engineer, wood spreaders shall not be used in any PCC where either face will be exposed or in any wall where water tightness is required.

If the PCC details are such that a feather edge or thin section might be created by the sequence of casting, a bulkhead should be introduced to maintain an edge thickness of at least 100 mm.

5.3.1 Placing Concrete Under Water (Tremie Method). Notwithstanding the provisions elsewhere stated in this specification, the following provisions shall apply to PCC deposited under water. PCC shall be deposited under water only when specifically authorized by the Engineer. The methods, equipment, materials, forms and cofferdams shall be approved by the Engineer before work is started, but such approval shall not in any way relieve the Contractor of liability in connection with the work.

Tremie Concrete shall comply with the provisions of CSA A23.1. The placing of PCC under water shall be carried on continuously until that portion of the structure is completed.

At the start of the concreting operation, the tremie pipe shall be sealed at the bottom with a plug or foot valve to prevent ingress of water.

All laitance, slime or other matter deposited or formed on the surface of any PCC under water shall be removed before any additional PCC is placed on same.

5.3.2 Placing and Finishing Bridge Deck Concrete. The finished surface of the deck concrete shall conform to grades and elevations shown on the contract drawings. Prior to placing deck concrete, the Contractor shall submit to the Engineer detailed information on the method and equipment proposed for handling, placing and finishing of the concrete. The Contractor shall also demonstrate to the satisfaction of the Engineer that all necessary adjustments have been made to provide the required camber, crown, slab thickness and concrete cover over reinforcement, prior to placement.

The surface shall be finished with a mechanical screed machine, which shall be supported by guide rails and span the full width of the deck. Guide rails shall be located outside the finished surface of the deck. Supports for the guide rails shall be capable of fine adjustment and not be fixed to, or located upon, the reinforcing steel. The quantity of supports shall be such that the screed rails do not deflect more than 1 mm during the screeding operation.

Immediately prior to placement of deck concrete, the formwork shall be cleaned and thoroughly moistened. The Contractor shall also moisten the reinforcing steel with water at the request of the Engineer. Deck concrete shall be placed continuously between transverse joints until completion of the section. The placing sequence for continuous structures shall conform with the contract drawings.

The concrete surface shall be floated with a wooden or magnesium float.

The concrete shall be textured by means of a burlap drag, broom or approved alternative.

There shall be no application of water or cement to the concrete surface for finishing purposes.

Deck concrete shall be water cured as indicated in Subsection 5.5.4 of this specification. During freezing temperatures, water curing shall be terminated 12 hours prior to the end of the protection period.

5.3.3 Roadway Concrete Curb/Gutter, Sidewalk, Jersey Barrier, Culvert Slabs and Haunches. Concrete curb/gutter shall be constructed in accordance with this specification and with drawings HS504 and HS505 or as noted in the Special Provision of the contract. Jersey Barrier shall be constructed in accordance with this specification and with drawing HS529 or as noted in the Special Provisions of the contract. Culvert slabs and haunches shall be constructed in accordance with this specification and with drawing HS506 or as noted in the Special Provisions of the contract. Roadway Curb/Gutter, Sidewalk and Jersey Barrier shall be constructed with wood or metal forms or by a slip form paver.

At driveways, concrete curb Type A shall be depressed 100 mm at the road edge and 80 mm at the back. Types B, C and D shall be depressed 120 mm at the road edge and 100 mm at the back. Unless otherwise specified, driveway widths as measured along the depression shall be 3.7 m for a single driveway and 5.0 m for a double driveway.

Catch basin metal frames and grates shall be adjusted to grade prior to placement of adjacent curb and gutter.

Control joints shall be formed by saw cutting or by use of a jointing tool. Control joints shall be constructed at right angles to the edge of the Curb/Gutter, Sidewalk and Jersey Barrier. Saw cuts shall be made between one quarter to one third of the depth of the section and extend along the entire exposed face. Concrete shall be saw cut as soon as possible after finishing without causing excessive raveling and before shrinkage cracks occur. Saw cutting shall be completed within 24 hours of the concrete achieving final set. Sidewalks shall be 1.5 m wide and 100 mm thick except at driveway entrances where the thickness shall be 150 mm. The maximum spacing of control joints for curb/gutter and Jersey Barrier shall be 5.0 m. The maximum spacing of control joints for sidewalk shall be 1.5 m. Control joints shall also be placed at a distance of 1.5 m from the centre of catch basins.

If an isolation jointing material is used, it shall be a pre-molded non-extruding bituminous impregnated fibre-board, 12 mm thick, conforming to ASTM D 1751. The jointing material shall extend the full width and depth of the section and shall be flush with the surface.

Curb/Gutter, Sidewalk and Jersey Barrier shall be cured as indicated in Subsection 5.5 of this specification.

The Contractor shall backfill the area behind the curb to a distance not exceeding 0.6 m from the back of the curb. The material used shall be of a common or borrow type free from large rock or organic material. Granular materials shall not be used.

5.4 Consolidation. All methods of consolidation shall be subject to the approval of the Engineer. PCC shall be consolidated thoroughly and uniformly by means of hand tamping, vibrators or finishing machines to obtain a dense, homogeneous structure, free from cold joints, voids and honeycomb.

A sufficient number of vibrators shall be employed to adequately handle the anticipated rate of placement. The size and frequency of vibrators shall be as specified in CSA A23.1. A stand-by vibrator shall be available on the site at all times.

Internal vibrators shall be used wherever practicable. External type vibrators may be used where surfaces cannot be properly consolidated with the internal type alone.

Insertion of internal vibrators shall be made systematically at intervals such that the zones of influence of the vibrator overlap.

Extreme care shall be taken to ensure that the internal type vibrators do not displace the reinforcing steel or the forms. Vibrators shall have rubber or non-metallic vibrating heads if epoxy coated reinforcing steel is used.

5.5 Curing Concrete. PCC shall be protected from freezing, premature drying, high temperature and moisture loss for a period of time necessary to develop the desired properties of the concrete. Curing shall be applied to PCC as soon as possible without damaging or marring the surface. The curing time shall be as indicated in CSA A23.1 or this specification. Curing shall be achieved by one or more of the following:

5.5.1 Burlap. Two layers of pre-soaked burlap shall be carefully laid on the surface as soon as the PCC has set sufficiently to support the mass of the burlap without marking the surface. Strips shall be overlapped 150 mm, secured to the surface and kept wet throughout the curing period.

5.5.2 Moisture Vapour Barrier. The Contractor shall provide an effective vapour barrier and prevent any flow of air between it and the PCC surface. Where polyethylene sheet is used, it shall be white opaque pigmented with a minimum thickness of 100 µm. The vapour barrier shall be secured to the surface and overlapped 150 mm.

5.5.3 White Pigment Liquid Membrane. Curing compounds shall not be used on a surface where a bond is required for additional PCC. A curing compound may be approved by the Engineer under certain circumstances where the application of moisture is impracticable and where such compounds will not jeopardize the appearance of the PCC. Curing compounds shall be applied at the Manufacturer's recommended application rate. Curing compounds are not permitted on construction joints, surfaces requiring weatherproofing sealants or deck sections.

5.5.4 Water. All PCC bridge decks shall be cured with water unless otherwise directed by the Engineer. PCC exposed surfaces shall be kept continuously moist for a minimum of seven consecutive days after placing when Type 10 or Type 50 cements are used. If Type 30 cement is used, the surfaces shall be kept wet for a minimum of three consecutive days after placement. The water for curing shall be clean and free from any material which could cause staining or discoloration of the PCC.

All freshly placed and consolidated PCC shall be suitably protected from the elements and from defacement due to building operations, traffic and vandals. The effects of direct sunshine, drying winds, cold, excessive heat and running water are particularly harmful. The PCC shall be protected by the use of adequate tarpaulins or other suitable material to completely cover, or enclose, all freshly finished surfaces.

5.6 Hot Weather Concreting. When the air temperature is at or above 27°C, or is likely to rise above 27°C within 24 hours, special measures, as detailed in CSA A23.1, shall be taken by the Contractor to protect the concrete from the effects of hot and/or drying weather conditions. The temperature of the formwork, reinforcing steel or the material on which the concrete is to be placed, shall not exceed 27°C.

Concrete temperatures shall not exceed those specified in CSA A23.1, Table 16.

5.7 Cold Weather Concreting. When the mean air temperature is at or below 5°C or when the temperature is likely to fall below 5°C within 24 hours, the Contractor shall place, cure and protect PCC in accordance with CSA 23.1 and this specification.

PCC shall not be placed on or against any surface which is at a temperature less than 5°C. Snow and ice shall be removed before PCC is deposited on any surface. Calcium chloride or other de-icing chemicals shall not be used as a deicing agent in the forms.

If the Department specifies heating of the mix water and/or aggregates, the charging cycle shall be altered to prevent flash setting of the PCC. Aggregates and water shall not be heated above 80°C. Water and/or aggregates heated to a temperature in excess of 40°C, shall be batched in the mixer first to reduce the temperature of the combination below 40°C, prior to the addition of the cementing materials . All frozen lumps of aggregate shall be excluded from the mix.

5.8 Protection Classes. Protection and curing depends upon the outside temperature, the wind velocity, and the size of the PCC section. Under normal circumstances the following methods of protection may be required to maintain the protection necessary for the conditions described.

Heating of the mixing water and/or aggregates shall be required for all classes of protection.

5.8.1 Special Protection. When the outside temperature during placing or during the protection period may fall below 5°C, adequate covering of all surfaces with tarpaulins or polyethylene sheets shall be provided.

5.8.2 Special Protection with Insulation. When the outside temperature during placing or during the protection period may fall below 0°C, all surfaces shall be covered with an approved insulating material, over which tarpaulins or polyethylene sheets are placed.

5.8.3 Complete Housing with Heat. When the outside temperature during placing or during the protection period may fall below -5°C, a complete housing of the PCC, together with supplementary heat, shall be provided. The Contractor shall ensure that heat is supplied uniformly around the PCC. For mass concrete, defined as minimum section dimension in excess of 2 m, the temperature gradient shall not exceed 20°C/m from the interior of the element to the exterior face. In thin sections, less than 2 m, the temperature differential from the interior to the exterior shall not exceed 20°C. Steam or hot air blowers may be used, but a means of maintaining relative humidity of not less than 95% shall be provided. When dry heat is used, hot air shall not be permitted to flow directly onto the PCC surface. Exhaust fumes shall be vented.

The protection and curing shall continue to maintain the temperature of the PCC at not less than 10°C for five days after placing. The PCC shall be kept above 0°C for a total period of fourteen days. If Type 30 cement is used, the protection period may be reduced to 70% of the stated times.

At the end of the curing and protection period, protection and heating shall be withdrawn in such a manner as not to induce thermal shock stresses in the PCC. The temperature of the concrete shall be gradually reduced to avoid cracking due to sudden temperature changes near the end of the curing period. The protection shall not be completely removed until the concrete has cooled to the temperature differential stated in Table 18 of CSA A23.1.

5.9 Concrete Surface Finish

5.9.1 Formed Surface. All formed surfaces shall receive the basic treatment as indicated below. In addition to the basic treatment, all exposed surfaces shall receive a "Smooth Form" finish as indicated below.

5.9.1.1 Basic Treatment. Upon removal of the forms, all cavities, honeycomb, and other deficiencies shall be patched with a sand cement mortar of the same composition as that used in the PCC. Mortar shall be composed of cement, fine aggregate and water, proportioned and mixed as specified. When the proportioning of cement and fine aggregate is not specified, the mortar shall consist of one (1) part by volume of cement and two (2) parts of fine aggregate. The quantity of water used in mixing the mortar shall be sufficient to make it capable of being freely spread with the trowel. Mortar shall be mixed in quantities which can be utilized within 60 minutes. Mortar shall not be re-tempered or remixed with water after initial set.

All bolts, ties, nails, or other metal not specifically required for construction purposes, shall be removed or cut back to a depth of 25 mm from the surface of the PCC unless otherwise directed by the Engineer. The cavity shall be keep saturated for 60 minutes prior to the application of a latex bonding agent or neat cement paste. The mortar shall be pressed or packed into the depressions so as to completely fill the cavity and then finished to match the adjacent surface. Fins, unsightly ridges, or other imperfections shall be chipped or rubbed off flush with the surface. Mortar patches in excess of 25 mm shall be applied in layers not exceeding 25 mm with a 30 minute interval between the placing of layers. The surface of the patch shall be textured equivalent to the adjacent concrete.

Honeycomb areas or cavities over 25 mm in diameter shall not be repaired until inspected by the Engineer. Where honeycombing has occurred in non-structural elements, the affected area shall be removed and filled with mortar as previously described. Where honeycombing has occurred in structural elements, the corrective method of treatment shall be carried out as directed by the Engineer.

All concrete and mortar shall be cured and protected in accordance with CSA A23.1 and Subsection 5.5 of this specification.

5.9.1.2 Smooth Form Finish. A Smooth Form Finish shall be a uniform, high quality concrete which has been homogeneously placed and thoroughly compacted. A Smooth Form Finish shall be uniform in colour, pattern and texture. Curbs, sidewalks, parapet walls, abutments, piers and any other surfaces the Engineer may designate, shall have a Smooth Form Finish.

If the concrete, after form stripping and the basic treatment, does not exhibit such finish, the Contractor shall perform any or all of the following operations, as directed by the Engineer, in order to obtain a Smooth Form Finish:

- cut out all corrodible metal within 25 mm of the surface and repair the cavities as indicated in Subsection 5.9.1.1, basic treatment.
- remove fins and other projections to leave a smooth, plane surface.
- remove stains, rust marks or other blemishes which detract from the specified uniformity of appearance.

5.9.2 Open Surfaces. The finished surface of concrete placed for such items as bridge decks, approach slabs, sidewalks and curbs shall conform to the lines, grades and elevations shown on the contract drawings and as stated herein.

5.9.2.1 Sidewalks. Sidewalk surfaces shall be laid out in blocks by use of a jointing tool, saw cutting or as indicated on the plans. Concrete edges and expansion joints shall be formed in the concrete at the designated locations. Joints shall be rounded using a 6 mm radius edging tool. Sidewalk surfaces shall be struck-off with a strike board and floated. The finished surface shall not vary more than 3 mm under a 3 m straight edge and shall be lightly broomed transversely to produce a textured, non-slip surface.

5.9.2.2 Decks. The finish deck surface shall be tight, smooth, free from ridges, depressions, undulations or blemishes. The surface shall receive a texture finish as indicated in Subsection 5.3.2 of this specification. Except across the crown, the deck surface shall be such that when tested with a 3 m long straight edge placed in any direction, there shall not be a gap greater than 8 mm between the bottom of the straight edge and the surface of the concrete.

Areas which do not meet the required surface profile shall be clearly marked and removed by the Contractor at the Contractor's expense. The Contractor shall, as directed by the Engineer:

- grind down any areas higher than 3 mm but less than 10 mm
- remove and replace deviations exceeding 10 mm. The quality of the repair shall be equal to or greater than the adjacent concrete in the undisturbed slab.

5.10 Damp-Proofing. The back face of abutments, wingwalls and retaining walls, from the top of footing to underside of curbs, as well as the top and sides of "culvert type structures", where PCC will be in contact with the earth fill, shall be damp-proofed.

Damp-proofing shall consist of one coat of emulsified asphalt diluted with clean water to a maximum of 50% by volume applied uniformly by brush or spray at the rate of 0.4 to 0.5 L/m^2 of surface area, followed, after the prime coat has cured, by one full strength coat of emulsified asphalt applied at a minimum rate of 0.5 L/m^2 of surface area.

6.0 QUALITY CONTROL / QUALITY ASSURANCE

6.1 General. Concrete shall be tested by the Department or its representative, at the point of discharge as delivered to the work site. Testing shall include but not be limited to:

• air content	-	CSA A23.2-4C
• slump	-	CSA A23.2-5C
• temperature	-	ASTM C1064
• compressive strength	-	CSA A23.2-9C

Testing by Department personnel, or representative, shall not relieve the Contractor of the overall responsibility for the strength and acceptability of the concrete supplied.

6.2 Field Adjustments. In the event that the slump and/or air content are outside the specified limit, the Contractor shall be allowed one adjustment to the concrete, conforming to the procedures outlined in CSA A23.2. If when retested, the concrete fails to meet Department Specifications, it shall be rejected unless otherwise directed by the Engineer. A minimum of two tests shall be performed on the failing property prior to concrete rejection. The Engineer shall be notified prior to any mix adjustments, however, this shall not relieve the Contractor of the responsibility to provide the specified compressive strength.

No water shall be added after the initial introduction of the mixing water for the mix, except at the start of discharge and when

- the measured slump is less than specified, and
- no more than 60 minutes(1) have elapsed after water and cement have been combined, and
- the concrete is in a stationary or truck mixer

(1) Subject to discretion of the Engineer, this time limit may be extended.

6.3 Strength Tests. For the purpose of acceptance on the basis of compressive strength, a set of cylinders shall be cast, cured and tested in accordance with the relevant specification indicated in Subsection 6.1 of this specification. The specified 28 day compressive strength is the acceptance criteria for concrete. A set of cylinders shall consist of three specimens, one specimen tested at 7 days and the remaining two tested at 28 days. The compressive strength shall be the average of the two 28 day test results.

6.4 Strength Criteria. The Department reserves the right to reject any concrete which does not meet all the requirements for the class of concrete specified.

Concrete shall be tested in accordance with CSA A23.1. The strength of each class of concrete shall be considered satisfactory if:

- the average of three consecutive strength tests equals or exceeds the specified strength, and
- no individual test is 3.5 MPa below the specified strength

6.4.1 Under Strength Concrete. Where the average of three consecutive strength tests is below the specified compressive strength, or any individual test is 3.5 MPa below the specified compressive strength, the Department may require replacement or reinforcing, at the Contractor's expense, of that portion of the structure. The Contractor may request coring to verify the insitu compressive strength of the section in question, however, such testing shall be conducted by a qualified independent testing laboratory at the Contractor's expense. A minimum of three cores shall be taken at locations determined by the Engineer. The compressive strength of all cores obtained shall be at least 85% of the specified compressive strength and no individual test result less than 75% of the specified strength. All testing shall be conducted in accordance with CSA A23.2-14C.

If the average compressive strength of the cores meets or exceeds the specified compressive strength the cost of coring by the testing laboratory shall be borne by the Department. The Contractor shall not be reimbursed for inconvenience and other associated costs of coring.

7.0 METHOD OF MEASUREMENT

7.1 General. Measurement shall be made at the contract unit price per cubic metre for Cast in Place Concrete. The quantity of concrete for payment shall be the volume in cubic metres computed from the dimensions shown on the drawings or as revised by the authority of the Engineer. No deductions shall be made for the volume of concrete displaced by steel reinforcement, joint material, structural shapes, chamfers, tops of piles, or cylindrical voids of 110 mm diameter or less.

7.1.1 Mud and Levelling Slabs. The quantity of concrete used for Mud or Leveling Slabs shall be determined by volume in cubic metres based on the delivery slip and placed in the work.

7.1.2 Curb/Gutter. The quantity of Curb/Gutter, including curb backing, shall be measured by the linear metre for the length accepted by the Engineer. No deduction shall be made for the reduced height at driveways and other entrances.

7.1.3 Sidewalks and Driveways. The quantity of Sidewalk, Driveway and other entrances shall be measured by the square metre accepted by the Engineer and placed in the work.

8.0 BASIS OF PAYMENT

8.1 General. Except as noted herein payment will be made at the contract unit price bid per cubic metre for Cast in Place Concrete. The payment for Cast in Place Concrete shall be considered full compensation for the cost of furnishing all materials, aggregates, cement, supplementary cementing materials, water, admixtures, and other materials, non-metallic expansion joint materials, tools, equipment, falsework, forms, bracing, labour, curing, surface finish, damp-proofing and all other items of expense required to complete the concrete work as shown on the plans, and as outlined in the specifications.

Payment for roadway Curb/Gutter and Jersey Barrier will be made at the contract unit price bid per linear metre. Payment for curb backing shall be included in the unit price for Curb/Gutter. Payment for Roadway Sidewalk and Driveway entrances will be made at the contract unit price per square metre.

8.2 Payment for Cold Weather Concreting. If it is considered necessary by the Department to place concrete in cold weather, additional payment for Cold Weather Concreting will be paid. Payment shall be as detailed in the Appendix C and shall be considered payment in full for the complete protection, as outlined in this specification.

If, in the opinion of the Engineer, the placing of concrete under cold weather conditions is a result of unjustified delays, negligence, etc. on the part of the Contractor, the precautions described herein shall be followed and the cost thereof shall be borne in full by the Contractor. If the Contractor wishes to place concrete during cold weather, but if in the opinion of the Engineer, this is not required to meet the original completion date, additional payment will not be made for the Cold Weather Concreting but the precautions taken shall follow the methods outlined herein. The Contractor must receive an extension, prior to the original completion date, if the contract exceeds the original completion date, before consideration will be given to the payment of Cold Weather Concreting.

9.0 WARRANTY

SECTION 13 - CONCRETE RESTORATION

1.0 DESCRIPTION

This section describes repairs to structural concrete excluding prestressed/post tensioned concrete members. It includes but is not limited to bridge decks, abutment walls, pier shafts, backwalls, beam seats, curbs, gutters, parapets, end posts/intermediate posts, fascia, sidewalks and soffits.

2.0 REFERENCES

All reference standards shall be the current issue or latest revision at the first date of the tender advertisement. This specification refers to the following standards, specifications or publications:

- ACI 117, Tolerances for Concrete Construction and Materials
- ASTM A 775M, Specification for Epoxy Coated Reinforcing Steel Bars
- ASTM A 820, Specification for Steel Fibers for Fiber Reinforced Concrete
- ASTM C 309, Specification for Liquid Membrane Forming Compounds for Curing Concrete
- ASTM C 881, Specification for Epoxy Resin Base Bonding Systems for Concrete
- ASTM C 1018, Test Method for Flexural Toughness and First Crack Strength of Fiber Reinforced Concrete
- ASTM D 1751, Preformed Expansion Joint Filler for Concrete Paving and Structural Construction
- CSA A23.1, Concrete Materials and Methods of Concrete Construction
- CSA A23.2, Methods of Test for Concrete
- CSA S269.3, Concrete Formwork
- CSA G30.18, Billet Steel Bars for Concrete Reinforcement
- CSA W186, Welding of Reinforcing Bars in Reinforced Concrete Construction
- Division 4 Section 7, Asphalt Concrete Patching
- Division 4 Section 8, Asphalt Concrete Paving of Bridge Decks
- Division 5 Section 6, Reinforcing Steel
- Division 5 Section 7, Cast in Place Concrete
- Division 5 Section 9, Waterproofing Concrete Bridge Decks
- Environmental Construction Practice
- Occupational Health and Safety Act
- SSPC-SP6, Commercial Blast Cleaning
- SSPC-Vis 1-89, Visual Standard for Abrasive Blast Cleaning

3.0 SUBMISSIONS AND DESIGN REQUIREMENTS

For concrete restoration, submissions are governed by the respective referenced standards and the project Special Provisions.

All work conducted at height shall be done in accordance with the latest edition of the Fall Protection and Scaffolding Regulations pursuant to the Occupational Health and Safety Act. The design of scaffolding by a Professional Engineer, as defined and required by this legislation, shall be submitted at the start of construction.

All work shall conform to the Environmental Construction Practice as attached to the approved Water Rights Application. Prior to the start of construction, an on site meeting shall be held to discuss the specific construction format proposed by the Contractor. The meeting shall be attended by the Contractor, Engineer, a representative of the Department of the Environment, and a representative of the Department of Fisheries and Oceans, if required.

4.0 MATERIALS

4.1 Ready Mixed Concrete. All ready mixed concrete shall be provided in accordance with Division 5 Section 7.

Unless otherwise specified, the specified compressive strength of concrete for repairs shall be 35 MPa and proportioned in accordance with the requirements of Division 5 Section 7.

4.2 Reinforcing Steel. Plain reinforcing steel shall be the size specified on drawings and shall be supplied in accordance with CSA G30.18, Grade 400R.

Epoxy coated reinforcing steel shall be used in repair areas where epoxy coated reinforcing steel is encountered. Epoxy coated reinforcing steel shall be Grade 400R and supplied in accordance with ASTM A 775M.

4.3 Fibres for Secondary Reinforcement of Concrete. Where indicated, steel fibres shall meet the requirements of ASTM A 820, Type 1, deformed, cold drawn steel wire, and of a minimum tensile strength of 1035 MPa.

Where indicated, polypropylene fibres shall be added to the concrete mixture at the Manufacturer's recommended dosage rate to prevent plastic shrinkage cracks.

The use of fibres in concrete will affect the plastic properties of the concrete and users may find it necessary to use additional admixtures such as superplasticizers to suit the site conditions. The size and dosage of the fibre shall be indicated in the Special Provisions.

4.4 Epoxy Coatings. Epoxy coatings for field application to plain (uncoated) reinforcing steel shall conform to ASTM C 881, Type IV, Grade 2, Class B and C.

5.0 CONSTRUCTION METHODS

5.1 Removal of the Existing Asphalt Surface

5.1.1. Bridge Approaches. All damaged pavement in the approaches of the bridge structure, or as otherwise directed by the Engineer, shall be removed. Additionally, the Engineer may direct, in writing, that the highway approaches on either end of the bridge structure be removed to a depth and a distance necessary to adjust for the change of grade, or to otherwise improve ride quality across the bridge. Other than the damaged pavement, only the asphalt concrete required to provide a smooth finished riding surface shall be removed from the approaches. The asphalt concrete shall be removed with a cold planer. The transverse junction between new and old asphalt shall be at an angle approximately 20° to the edge of the pavement. This transverse junction may be achieved by staggered and overlapping passes of the cold planer to create a stepped junction diagonally across the pavement.

5.1.2 Bridge Deck. The Contractor shall cut, remove and dispose of the existing asphalt concrete and waterproofing (if any) on the bridge deck. The removal of the pavement and waterproofing membrane from the portland cement concrete deck shall be undertaken in such a manner as to prevent damaging the bridge deck. Any damage to the bridge deck caused by the removal of the existing asphaltic concrete shall be repaired in accordance with the Department's specifications at the Contractor's sole cost. All debris shall be removed completely from the site. Disposal of all debris shall be in accordance with environmental regulations, construction debris disposal bylaws, and in such a manner as to prevent any unsightly appearance from the highway.

5.2 Concrete Repair

Prior to concrete removal the quantities outlined by the Contractor shall be verified by the Engineer or his representative employing one or more of the following techniques:

- visual observations
- sounding or chain drags
- half cell survey
- radar techniques

Concrete shall be removed in such a manner as to prevent damage to adjacent concrete, other components and utilities that are to remain in place. Reinforcing steel, prestressing tendons, shear connectors, structural steel and other components that are to remain in place shall not be damaged or loosened. The Contractor shall ensure that hammers do not come in contact with reinforcing bars in a manner which will cause debonding of bars in adjacent concrete areas not being repaired.

Concrete removal shall not be permitted within 1 m of newly placed concrete for a period of 72 hours.

The Contractor shall prevent contamination, by oil or other deleterious substances, of the concrete surfaces.

The Contractor shall remove all loose and delaminated concrete, as directed by the Engineer. The initial fracturing of the concrete shall be conducted with breaking hammers. Concrete chipping and removal thereafter to the top of the reinforcing steel mat shall be conducted with jack hammers (14 kg maximum). Final determination of the extent of the damaged area shall be made as the work progresses by visual inspection, tapping with a hammer, or half cell. Where the corrosion potential of the reinforcing steel adjacent to the patch perimeter is more negative than -0.350 volts, additional concrete removals may be required by the Engineer. The Contractor shall schedule activities to provide for such surveys, and no claims for delay will be entertained as a result of failure to coordinate with Department forces.

Concrete debris shall be removed completely from the site. Disposal of all debris shall be in accordance with environmental regulations, construction debris disposal bylaws, and in such a manner as to prevent any unsightly appearance from the highway.

Prior to concrete removal the perimeter of the area to be removed shall be sawn (overhead repairs excluded) to a depth of 20 mm or to the depth of the reinforcing steel bar, whichever is less. If additional areas are found after concrete removal the perimeter shall be sawn as indicated above. Reinforcing steel shall not be cut.

The Contractor shall remove concrete to a minimum uniform depth of 20 mm behind the bottom layer of the top mat of reinforcing steel.

Jack hammers shall be used for the removal of concrete in front of and between the reinforcing bars. Only chipping hammers, maximum mass 7 kg, shall be used for the removal of concrete behind and within 25 mm of any reinforcing bars that are to remain and that are located within 100 mm of concrete to remain in place.

Concrete removal shall extend along the reinforcing steel to the point where it is free from significant rust. Concrete covering the reinforcing steel at the edge of the repair area will be sounded by the Engineer for local delamination before removal operations are completed.

Where the area of concrete removal with exposed reinforcing steel exceeds 2 m^2, the reinforcing steel shall be retied at every second intersection point and shall be supported to maintain the steel mat in its original location. Supports, shall be approved by the Engineer prior to use, placed as required and tied securely to the reinforcing steel.

5.3 Abrasive Blast Cleaning

5.3.1 Concrete Surfaces. Abrasive blast cleaning shall only be permitted when the concrete and steel are surface dry.

Areas and components not designated for abrasive blast cleaning and all epoxy coated reinforcing steel shall be protected from adjacent abrasive blast cleaning operations.

The abrasive blast cleaning shall be of such an extent to expose and clean the coarse aggregate and remove all dirt, laitance and hardened concrete slurry. Any oil or grease on the surface of the concrete shall be removed prior to blast cleaning.

The saw cuts at all patch perimeters shall be abrasive blast cleaned to remove all polished surfaces from the cutting operation.

All abrasive debris shall be removed from the patch area with compressed air or high pressure water blasting equipment.

Immediately after abrasive blast cleaning is completed, the Engineer will inspect the cleaned surface for fractured concrete, or loose aggregate. This material shall be removed using hand tools.

Any damage incurred to vehicles or their cargo or injury sustained to their occupants as a direct or indirect result of the Contractor's actions, procedures or negligence shall be the sole responsibility of the Contractor

5.3.2 Reinforcing Steel. The full circumference of the existing exposed reinforcing steel shall be cleaned to conform with SSPC-SP6, Commercial Blast Cleaning. Acceptance of the surface preparation will be based on the applicable SSPC surface preparation specification and visual standards given in SSPC-VIS 1.

The placement of the concrete shall be completed within 36 hours of the blast cleaning or the reinforcing steel shall be reblasted.

Only if the original reinforcing steel in the element is protected with an epoxy coating, shall all reinforcing steel be required to be completely recoated with two applications of epoxy or other approved insulating material immediately prior to the placing of the new concrete/mortar. The first coat of epoxy shall be applied prior to the wetting of the concrete surface. The second coat of epoxy shall be in a tacky condition when the new concrete/mortar is placed.

If the original reinforcing steel in the element is found to have suffered substantial corrosion resulting in loss of greater than ten percent of its nominal cross sectional area the Engineer may order the placement of new reinforcing bars or splice to existing bars.

5.4 Concrete Reinstatement.

The Contractor shall notify the Engineer 24 hours prior to the time intended to place the patching material. The work shall not proceed until the surface preparation has been inspected by the Engineer.

Hot and cold weather concrete placements shall be conducted in accordance with the respective clauses of Division 5 Section 7.

Patching operations shall be suspended during rain or other climatic conditions which, in the opinion of the Engineer, may adversely affect the quality of the work. Any portions of the concrete patch with incomplete consolidation or finishing shall be removed.

All dust and loose material shall be removed from the prepared surface of the repair area by oil free compressed air before the application of the bonding agent.

Prior to the placement of the concrete, the concrete surfaces to be patched shall be maintained in a wet condition for a period of not less than one hour. Excess water shall be removed from the surface, so as to achieve a saturated surface dry condition, using oil free compressed air immediately prior to application of the bonding agent.

Bonding agents shall be used wherever feasible for concrete patching. Bonding agents shall consist either of a cement/sand grout or a latex modified grout.

The sand/cement grout shall consist of a 1:1 sand/cement mixture mixed to a flowable consistency with a maximum water to cement ratio of 0.40.

For the latex modified grout, a latex bonding agent shall be added to the sand/cement grout described above. The proportions of cement, sand, latex, and mixing water shall be in accordance with the latex Manufacturer's instructions. No free standing water shall be present in the patch area prior to application of the latex modified bonding agent.

The bonding agent shall be scrubbed into the patch area immediately ahead of the concrete placement. Pockets of excess grout shall be removed.

Concrete placement in the patch areas shall be conducted in accordance with Subsection 5.3 of Division 5 Section 7.

Immediately after placing concrete all surfaces shall be cured in accordance with Division 5 Section 7 of the standard specifications. Bridge deck repairs shall be cured using a layer of polyethylene placed immediately over wet burlap. The Contractor shall be responsible for ensuring that the burlap is kept wet at all times. Deck repairs shall remain covered for a minimum of 72 hours or until a compressive strength of 27 MPa is attained. The curing material shall then be removed and the concrete permitted to air dry for a minimum period of 48 hours prior to waterproofing.

5.5 Waterproofing Concrete Bridge Decks.

All waterproofing membrane replacement shall be conducted in accordance with Division 5 Section 9 of these specifications. New waterproofing shall be compatible with existing waterproofing materials.

5.6 Asphalt Concrete Reinstatement. Asphalt concrete shall be replaced on the bridge deck in accordance with the requirements of Division 4 Section 8. Other affected areas shall be replaced in accordance with the requirements of Division 4 Section 7.

6.0 QUALITY CONTROL / QUALITY ASSURANCE

6.1 Quality Assurance. Concrete testing shall be conducted in accordance with Division 5 Section 7. The efforts of the Department's forces does not augment or replace the Contractor's responsibilities to adhere to the requirements of the specification.

Prior to waterproofing application and after the curing period, all concrete patch areas shall be sounded to detect the presence of any delaminations in the patch concrete. At the Engineer's discretion, further testing may be directed in potentially delaminated areas. Testing may include concrete coring and bond tests in accordance with CSA A23.2-6B-94.

7.0 METHOD OF MEASUREMENT

7.1 Asphalt Concrete Removal. Asphalt concrete removal at bridge approaches, as described in Subsection 5.1.1, shall be measured by the square metre and based on the original lines and dimensions.

Asphalt Concrete Removal on bridge decks, as described in Subsection 5.1.2, shall be measured as one unit (each) and based on the original lines and dimensions.

7.2 Concrete Repair of Horizontal and Vertical Surfaces. Measurement shall be made by the square meter of repaired concrete area based on the original lines and dimensions. On bridge structures the horizontal surface is defined as being those surfaces between the outer edges of the curb, sidewalks or parapet structures. Horizontal surface measurement shall also include vertical faces of the inner edge of the curb, sidewalk and parapet. The areas where deteriorated concrete is removed, up to 150 mm depth, shall be measured and the quantity computed. Any area where the removal of unsound concrete exceeds more than 150 mm into the underlying concrete shall be identified and computed separately. When concrete removal exceeds 150 mm, at intersecting surfaces, only one additional surface shall be measured.

7.3 Soffit Repairs. Measurement for concrete repair of deck soffits will be based on the area in square metres of repaired work.

7.4 Through Repair. Measurement for concrete through repair of deck topsides, curbs, gutters and medians will be based on the area in square metres of repaired work.

7.5 End Posts/Intermediate Posts. End posts/intermediate posts, indicated for replacement, shall be detailed in the Special Provisions and measured as each. The unit price shall be all inclusive to conduct the work described in the Special Provisions.

7.6 Reinforcing Steel. Reinforcing steel, where indicated or as directed by the Engineer, shall be measured per kilogram installed. No measurement shall be made for welding of reinforcing steel or mechanical splices or couplings.

8.0 BASIS OF PAYMENT

8.1 Asphalt Concrete Removal. Removal of asphalt concrete from the bridge approaches will be paid at the contract unit price per square metre, which shall be full compensation for removal and disposal of the old asphalt concrete. Removal of the existing asphalt wearing surface and waterproofing on the bridge deck will be paid at the contract lump sum price and shall be full compensation for removal and disposal of all material. The Contractor shall supply all equipment, plant, labour and tools necessary for the cutting, planing, removal, loading and disposal necessary to complete the work.

8.2 Concrete Repair on Horizontal Surfaces. Concrete removal and repair on horizontal surfaces will be paid at the contract unit price per square metre. In addition to this payment item, the Contractor shall be paid at a rate equal to fifty (50) percent of the contract unit price per square meter bid for the area of repairs exceeding 150 mm in depth within the original concrete structure. When concrete removal exceeds 150 mm in depth, payment shall be made for only one of the intersecting surfaces. The payment shall be considered full compensation for the cost of furnishing all materials, aggregates, cement, supplementary cementing materials, water, admixtures, equipment, false work, forms, bracing, labour, curing, surface finish and all other items of expense required to complete the work as shown on the plans and as outlined in the specifications. There shall be no other consideration for payment caused by the depth of repair or degree of difficulty of repair for this work.

Payment includes but not necessarily limited to the following: patch perimeter saw cutting, concrete chipping, removal and disposal, abrasive blast cleaning of the patch and reinforcing, application of bonding agent, forming, concrete reinstatement, and curing.

8.3 Concrete Repair on Vertical Surfaces (including beam seats). Concrete removal and repair on vertical surfaces will be paid at the contract unit price per square metre. In addition to this payment item, the Contractor shall be paid at a rate equal to fifty (50) percent of the contract unit price per square meter bid for the area of repairs exceeding 150 mm in depth within the original concrete structure. When concrete removal exceeds 150 mm in depth payment shall be made for only one of the intersecting surfaces. The payment shall be considered full compensation for the cost of furnishing all materials, aggregates, cement, supplementary cementing materials, water, admixtures, equipment, false work, forms, bracing, labour, curing, surface finish and all other items of expense required to complete the work as shown on the plans and as outlined in the specifications. There shall be no other consideration for payment caused by the depth of repair or degree of difficulty of repair for this work.

Payment includes but not necessarily limited to the following: patch perimeter saw cutting, concrete chipping, removal and disposal, abrasive blast cleaning of the patch and reinforcing, application of bonding agent, forming, concrete reinstatement, and curing.

8.4 Soffit Repairs. Payment for concrete repair of deck soffits will be paid at the contract unit price per square metre and shall be full compensation for the removal, surface preparation, supply of all materials, labour, tools and equipment necessary to complete the repairs to the satisfaction of the Engineer. Soffit repairs will include repair of overhead areas which are formed from the underside of the structure as well as the outside edges of the curb and parapet walls on bridges.

8.5 Through Repair. Payment for concrete through repair of deck topsides will be paid at the contract unit price per square metre of through repair and shall be full compensation for the removal, surface preparation, supply of all materials, labour, tools and equipment necessary to complete the repairs to the satisfaction of the Engineer. Payments for through repair will apply only to repairs undertaken from the topside. No area of repair will be paid for more than once in any patch.

8.6 End Posts/Intermediate Posts. End posts/intermediate posts will be paid as each and the unit price shall be all inclusive to conduct the repair as detailed in the Special Provisions.

8.7 Reinforcing Steel. Reinforcing steel, will be paid on the basis of per kilogram of reinforcing steel installed. No payment will be made for welding of reinforcing steel or mechanical splices or couplings.

9.0 WARRANTY

SECTION 2 - FLOW CHECKS

1.0 DESCRIPTION

The Contractor shall, where directed, supply, install, replace and remove flow checks. Flow checks shall be constructed across roadside drainage ditches, throughout cut sections and adjacent to the inlets and outlets of culverts to reduce the channel velocity, promote the deposition of suspended sediment and provide a trap for bed-load material.

For the purpose of this specification flow checks shall comprise three distinct types:
- Straw Bale Flow Checks
- Sandbag Flow Checks
- Rock Flow Checks

2.0 REFERENCES

All reference standards shall be current issue or latest revision at the first date of tender advertisement. This specification refers to the following standards, specifications or publications:
- Division 3 Section 4, Clear Stone.
- Division 7 Section 1, Sediment Barriers.
- Division 7 Section 4, Maintenance and Sediment Control.
- Drawing HS705.DWG.
- Drawing HS706.DWG
- Drawing HS707.DWG.
- NSDOE, Erosion Control and Sedimentation Control Handbook for Construction Sites.

3.0 SUBMISSIONS AND DESIGN REQUIREMENTS

4.0 MATERIALS

4.1 Clear Stone. C2 and C5 Clear Stone as per Division 3 Section 4 of these specifications shall be used as shown on the plans or as directed by the Engineer.

4.2 Straw Bale Flow Checks. Straw bale flow checks shall be constructed of a double row of bales.

4.3 Sandbag Flow Checks. Sandbag flow checks shall be constructed of three layers of sandbags.

4.4 Rock Flow Checks. Rock flow checks shall be constructed of clear stone.

5.0 CONSTRUCTION METHODS

5.1 Straw Bale Flow Checks. The requirements for straw barriers, Division 7 Section 1, shall apply with some modifications. Where straw bale flow checks are to be installed on earth surfaces the trench shall be 1500 mm wide. The two rows of bales shall be butted tightly beside one another without gaps. The bales in the two rows shall be uniformly staggered to one another, so that the ends of the upstream row of bales are adjacent to the centers of the downstream row of bales. The ends of the flow check, at ground level, shall be higher than the top of the lowest point of the flow check. The upstream row of bales shall be one bale longer than the downstream row.

5.2 Sandbag Flow Checks. The requirements for sandbag barriers, Division 7 Section 1, shall apply with some modifications. The ends of the flow check, at ground level, shall be higher than the top of the lowest point of the flow check.

5.3 Rock Flow Checks.

5.3.1 During Construction. During construction rock flow checks may have to be placed across a ditch or channel. Both 150 mm minus Clear Stone and 20 mm minus Clear Stone shall be piled across the ditch or channel to a height 450 mm above the lowest point of the ditch or channel.

5.3.2 After Final Grading. After final grading rock flow checks may have to be placed across a ditch or channel. Both 150 mm minus Clear Stone and 20 mm minus Clear Stone shall be piled across the ditch or channel to a height 350 mm above the lowest point of the ditch or channel.

On the downstream side of the flow check an apron shall be constructed to prevent scour. The apron shall consist of an approved erosion control blanket placed on the existing ground or 150 mm minus Clear Stone placed in a 250 mm excavated trough. In both cases the erosion control blanket or Clear Stone shall extend across the entire ditch or channel and up the side slopes to an elevation equaling the height of the flow check. The length of apron shall be between 1.5 and 2.0 m.

On the upstream side of the flow check a trough, 4000 mm (minimum) in length and equal to the width of the existing ditch or channel shall be excavated to a depth of 150 mm.

5.3.3 Overflow Weir. A level overflow weir 150 mm deep shall be formed in the top of the flow check so that it extends from the upstream to the downstream side and its crest is centered over the lowest portion of the ditch or channel. The overflow weir crest should extend 300 mm on either side of centerline.

5.3.4 Installation and Maintenance. Rock flow checks shall be installed and maintained in place, without gaps, and without undermining, to prevent sediment passage through or under the flow check.

5.4 Buffer Zones. Flow checks shall be constructed within each culvert buffer zone to the prescribed installation techniques contained in the "Erosion and Sedimentation Control Handbook for Construction Sites" Section 2.7, which states "make sure the top of the check dam (flow check) is as high as the base of the one upstream."

5.5 Ditching. Flow checks shall be constructed along any new ditching of the highway including the median at spacings to be determined by dividing 200 m by the ditch grade in percent. Flow checks are to be installed during construction and after ditches are brought to final grade.

5.6 Catch Basins. Flow checks shall be constructed around new catch basins located in the highway median.

5.7 Removal. After vegetation has established and at the direction of the Engineer, flow checks may have to be removed. If necessary, the unvegetated areas remaining, after flow checks removed, shall be covered with an approved erosion control blanket.

6.0 QUALITY CONTROL / QUALITY ASSURANCE

7.0 METHOD OF MEASUREMENT

Measurement for Flow Checks shall be by the metre of flow checks installed or replaced, measured horizontally across the top of the flow check as noted on specification drawings HS705.Dwg, HS706. Dwg, HS707.Dwg.

8.0 BASIS OF PAYMENT

- Straw Bale Flow Checks
- Sandbag Flow Checks
- Rock Flow Checks

Payment at the contract unit price for the above tender item(s) shall be full compensation for all labour, equipment and material to do the work.

Payment will be made as per Division 7 Section 2 for flow checks replaced if the original flow checks had been properly installed or constructed and approved by the Engineer and failure was not attributable to the Contractor.

Payment will be made as per Division 7 Section 4 for flow checks needing repair if the original flow checks had been properly installed or constructed and approved by the Engineer and failure was not attributable to the Contractor.

It will be at the discretion of the Engineer whether payment as per Division 7 Section 2 or Division 7 Section 4.

Maintenance and removal and management of sediment that is accumulated by flow checks will be paid for under Division 7 Section 4.

9.0 WARRANTY

SECTION 3 - SETTLEMENT PONDS

1.0 DESCRIPTION

The Contractor shall, where directed, construct and remove settlement ponds. Settlement ponds are to be used to intercept and retain sediment laden runoff so that sediment may settle out.

2.0 REFERENCES

All reference standards shall be current issue or latest revision at the first date of tender advertisement. This specification refers to the following standards, specifications or publications:

- Division 2 Section 3, Roadway and Drainage Excavation
- Division 2 Section 5, Borrow.
- Division 2 Section 8, Compaction.
- Division 3 Section 4, Clear Stone.
- Division 7 Section 4, Maintenance and Sediment Control.
- Drawing HS708, Settlement Ponds.

3.0 SUBMISSIONS AND DESIGN REQUIREMENTS

4.0 MATERIALS

C2 Clear Stone and C5 Clear Stone as per Division 3 Section 4 of these specifications shall be used as shown on the plans or as directed by the Engineer.

5.0 CONSTRUCTION METHODS

Settlement ponds shall be built as a single control measure, consisting of an excavated and/or constructed basin, a spillway and a clear stone filter.

The excavated basin shall have a minimum depth of 1.2 m below the existing ground surface. The bottom of the excavated basin shall be horizontal and the sides of the basin shall be no steeper than 1.5:1.

If the sides of the basin are constructed the embankment material shall be impervious borrow or common material.

The inside walls of the sediment pond should be lined with 150 mm minus Clear Stone.

The top of spillway shall be constructed 300 mm below the top of the settlement pond wall.

The outside face of the spillway shall be offset 300 mm inward from the outside face of the settlement pond wall.

The inside faces of both the spillway and the settlement pond shall be flush.

At the discretion of the Engineer a temporary fence shall be erected around the settlement pond to restrict public access.

6.0 QUALITY CONTROL / QUALITY ASSURANCE

7.0 METHOD OF MEASUREMENT

8.0 BASIS OF PAYMENT

Payment for settlement ponds will be at the individual contract unit prices for Roadway and Drainage Excavation Common, Borrow, Compaction and Clear Stone.

Payment for Roadway and Drainage Excavation Common will be made as per Division 2 Section 3 for all material excavated to construct the settlement pond which shall be full compensation for all labour, equipment, and materials required to do the work, after the construction of the settlement pond has been approved by the Engineer.

Payment for Borrow will be made as per Division 2 Section 5 for all Borrow required to construct the settlement pond which shall be full compensation for all labour, equipment, and materials required to do the work, after the construction of the settlement pond has been approved by the Engineer.

Payment for Compaction will be made as per Division 2 Section 8 for all Compaction required to construct the settlement pond which shall be full compensation for all labour, equipment, and materials required to do the work, after the construction of the settlement pond has been approved by the Engineer.

Payment for Clear Stone will be made as per Division 3 Section 4 for all Clear Stone required to construct the settlement pond which shall be full compensation for all labour, equipment, and materials required to do the work, after the construction of the settlement pond has been approved by the Engineer.

Payment will be made as per Division 2 Section 3, Division 2 Section 5, Division 2 Section 8 and Division 3 Section 4 for settlement ponds replaced if the original settlement pond has been properly constructed and approved by the Engineer and failure was not attributed to the Contractor.

Payment will be made as per Division 7 Section 4 for repair of settlement ponds if the original settlement pond had been properly constructed and approved by the Engineer and failure was not attributed to the Contractor.

It will be at the discretion of the Engineer whether payment will be as per Division 2 Section 3, Division 2 Section 5, Division 2 Section 8 and Division 3 Section 4 or Division 7 Section 4.

Maintenance of settlement ponds and the removal and management of sediment that accumulates in settlement ponds shall be paid for as per Division 7 Section 4.

9.0 WARRANTY

SECTION 5 - HYDROSEEDING

1.0 DESCRIPTION

This item of work shall consist of the supply and application of a mixture of seed, fertilizer, mulch, binder and water on foreslopes, median, backslopes, ditches and other prepared areas designated by the Engineer, to produce a uniform cover of grasses.

2.0 REFERENCES

All reference standards shall be current issue or latest revision at the first date of tender advertisement. This specification refers to the following standards, specifications or publications:
- Division 7 Section 6, Mulching.
- Division 7 Section 7, Erosion Control Blankets.
- Division 7 Section 8, Topsoil.

3.0 SUBMISSIONS AND DESIGN REQUIREMENTS

4.0 MATERIALS

All materials shall be supplied by the Contractor.

The seed mix shall consist of:
- 40% Creeping Red Fescue
- 15% Timothy
- 15% Tall Fescue
- 10% Kentucky Blue Grass
- 10% Alsike Clover
- 5% Red Top
- 5% Perennial Rye

At the discretion of the Engineer, oats may be included in the seed mix.

Each species shall meet or exceed the Canadian Grade Standards for Common No. 1 seed.

Fertilizer shall be 15-25-15 for seeding done May 1st to September 1st and 10-20-20 thereafter. Fertilizer shall conform to the Canada Fertilizer Act and Regulations.

Mulch shall be shredded newsprint (cellulose) or wood fiber colored green with environmentally acceptable dye. Mulch shall contain no toxic or growth-inhibiting chemicals or compounds.

Binder (tackifier) may be supplied in liquid or powder form and shall be applied at the Manufacturer's recommended application rate.

Water shall be free of any impurities which would inhibit germination of grasses.

Bags of seed and fertilizer shall be labeled, identifying mass (kg), mix components and percentages, date of bagging and supplier's name. Alternatives to the specified seed and fertilizer mixes will not be accepted without prior approval of the Engineer. The Engineer may sample the seed and fertilizers for analysis.

Seed and fertilizer shall be kept dry and protected from sunlight and other detrimental conditions. Seed and fertilizer that have been subjected to moisture will not be acceptable for use.

5.0 CONSTRUCTION METHODS

Hydroseeding shall be carried out as soon as possible after the completion of the surface preparation. Final dressing of the slopes shall be done as areas are completed to enable hydroseeding to be done in stages as work progresses, in accordance with the Work Progression Schedule of the contract.

Hydroseeding will not be permitted on hardened or crusted soil. Final dressing of slopes shall include removal of deleterious materials such as sticks, roots or large rocks; loosening of the top 50 mm of soil; and scarification to minimize runoff velocities.

Scarifications shall be parallel to the contour of the slope with a minimum indentation (high to low) of 25 mm and at a maximum spacing of 150 mm. Scarifying can be made by means of dozer treads or any other mechanical means such that scarifications meet the above noted specifications. If topsoil is to be utilized it shall be placed in accordance with Division 7 Section 8, Topsoil.

Hydroseeding shall not be performed under windy conditions or during periods of rainfall, on areas covered by standing water, on frozen surfaces or under other adverse conditions, as determined by the Engineer.

The mulch, seed, fertilizer and binder shall be thoroughly mixed with water in a hydroseeding tank capable of continually agitating the mixture during the hydroseeding operation to ensure that a homogeneous slurry is produced.

Application rates shall be as detailed in Table 7.5.1.

Table 7.5.1 - Application Rates

Hydroseeding 'A'	Hydroseeding 'B'
Seed - 100 kg/ha	Seed - 100 kg/ha
Fertilizer - 625 kg/ha	Fertilizer - 625 kg/ha
Mulch (paper or wood fiber) - 1350 kg/ha	Mulch (paper or wood fiber) - 350 kg/ha
Binder(1) (tackifier) - per Manufacturer's specifications	Binder(1) (tackifier) - per Manufacturer's specifications

(1) Binder shall be used for all hydroseeding work. Application rates may vary ± 10% depending on ground conditions, at the discretion of the Engineer.

The Contractor shall proportion the ingredients in the hydroseeding tank according tc the size of the tank and the area anticipated to be covered with each tankful of mix, so that the materials are applied at the prescribed rates. The Contractor shall adjust the quantities of ingredients per tankful as required if the actual coverage (m^2/tank) is different from that anticipated.

The mixture shall be applied uniformly onto prepared surfaces from a hydroseeder which shall be capable of spraying the extremities of slopes or other areas of exposed ground, whether through the towergun nozzle or extension hoze.

Hydroseeding 'A' and Hydroseeding 'B' carried out between May 1st and September 1st shall produce a satisfactory growth of grasses and clover at least 95 percent of the area seeded. Areas of poor growth that exceed 5 percent of the total area seeded shall be reseeded at the Contractor's expense. The success of the seeding will be judged by the Engineer at the end of the growing season (September 1st).

Hydroseeding carried out after September 1st will be measured for full payment if the ground preparation, hydroseeding and mulching (with tacifier) have been carried out in accordance with this specification.

Hydrosseding 'B' shall be used when hydroseeding is to be covered with mulch or erosion control blanket. In these cases hydroseeding shall be covered with mulch or erosion control blanket within 48 hours.

6.0 QUALITY CONTROL / QUALITY ASSURANCE

7.0 METHOD OF MEASUREMENT.

Measurement for hydroseeding shall be the area in square metres acceptably hydroseeded using the aforementioned seed mix, fertilizer, lime, mulch and binder, measured along the slope of the ground.

8.0 BASIS OF PAYMENT

- Hydroseeding 'A'
- Hydroseeding 'B'

Payment for hydroseeding at the contract unit price shall be full compensation for all labour, equipment and material necessary to perform the work.

Preparation of slopes or other areas for hydroseeding and removal of deleterious materials will not be measured for payment, but shall be considered as incidental to the bid items under which the excavation or embankment construction of such areas was carried out.

Payment for mulching over hydroseeded areas will be measured for payment as per Division 7 Section 6.

Placing Erosion Control Blanket over hydroseeded areas will be as per Division 7 Section 7.

If topsoil is used, payment for topsoil will be made as per Division 7 Section 8.

9.0 WARRANTY

SECTION 7 - EROSION CONTROL BLANKETS

1.0 DESCRIPTION

This item shall consist of the supply and placement of erosion control blankets.

2.0 REFERENCES

3.0 SUBMISSIONS AND DESIGN REQUIREMENTS

The Contractor shall submit a request to the Engineer stating the specific blanket planned for use and the Manufacturer's specifications for that blanket. The blanket may only be used upon the approval of the Engineer. If more than one type of blanket is to be used, the location or type of usage shall also be submitted for approval.

4.0 MATERIALS

Erosion control blanket shall be of consistent thickness with an even fiber distribution. Blankets shall be supplied in a rolled mat form and be protected with an outer waterproof wrap bearing the Manufacturer's label indicating product name.

4.1 Jute Erosion Control Blankets. Jute blankets shall consist of undyed and unbleached 100% natural jute fiber woven mesh. Jute mesh shall meet the following specifications:

- warp ends per metre of width - 60 min.
- waft ends per linear metre - 40 min.
- average mass - 0.30 kg/m^2 ± 5%
- yarn thickness - may not vary by more than one-half its normal diameter

4.2 Excelsior or Wood Fiber Erosion Control Blankets.

4.2.1 Excelsior Blankets. Excelsior blankets shall consist of a machine produced mat of curled wood excelsior with 80% of the fibers 150 mm, or longer, in length. The fiber shall be of consistent thickness and evenly distributed over the entire area of the blanket. One side of the blanket shall be covered with a biodegradable plastic mesh.

4.2.2 Wood Fiber Blankets. Wood Fiber Blankets consist of wood fiber bonded to a photodegradable netting, of consistent thickness and evenly distributed over the entire area of the blanket. One side of the blanket shall be bonded to a photodegradable netting.

4.3 Straw Erosion Control Blankets. Straw Erosion Control Blankets shall consist of a machine produced mat of straw sewn together with biodegradable plastic mesh and/or photo degradable netting thread with an average mass of 0.22 kg/m^2 to 0.28 kg/m^2

4.4 Polypropylene Erosion Control Blanket. Polypropylene Erosion Control Blankets shall consist of polypropylene staple fibres reinforced with a polypropylene netting and shall meet the following specifications.

- chemically inert
- fire retardant (meets flamability test CS191-53)
- minimum weight 0.02 kg/m^2

4.5 Staples. Staples shall be U-shaped and be constructed of wire with a diameter of at least 2.5mm, with legs at least 150mm long and 25mm apart or an approved equal.

5.0 CONSTRUCTION METHODS

5.1 Blanket Placement. The placement and stapling of erosion control blanket shall follow the application of seed and fertilizer and shall be done on the same day. If soil conditions warrant immediate protection then the Engineer may direct that erosion control blanket placement and stapling precede the application of seed and fertilizer.

Erosion control blankets shall be placed to form a continuous mat and be stapled in position. Excelsior Erosion Control Blanket shall be butted at the edges. Jute and Straw Erosion Control Blankets shall be overlapped on all edges as per the Manufacturer's specifications. Overlap shall be in the direction of drainage flow.

At the top of a slope the erosion control blanket shall be anchored in a 150mm deep by 150mm wide trench. After stapling the trench shall be backfilled and compacted.

The terminal ends of blankets used in ditches and channels shall be anchored in a 150mm deep by 150mm wide trench. After stapling the trench shall be backfilled and compacted.

For placement on slopes which are 3:1 or steeper and which are longer than twice the width of the blanket, the erosion control blanket shall be unrolled perpendicular to the top of fill slopes.

For placement in ditches, the erosion control blanket shall be unrolled parallel to the centerline of the ditch. Blankets unrolled parallel to the centerline shall extend a minimum of 1m up the front and back slopes. Longitudinal joints shall not be within 300 mm of the centerline of the ditch.

End joints of adjacent blankets shall be staggered.

5.2 Stapling. Erosion control blankets shall be stapled in position as they are placed. Staples shall be driven through the blanket and full length into the ground, perpendicular to the slope.

Stapling shall be carried out in the field as per the manufacturer's specifications.

6.0 QUALITY CONTROL / QUALITY ASSURANCE

7.0 METHOD OF MEASUREMENT

Measurement for erosion control blanket shall be the area in square metres acceptably installed and in place, measured along the slope of the ground. No additional payment will be made for blanket overlap.

8.0 BASIS OF PAYMENT

- Jute Erosion Control Blanket
- Excelsior or Wood Fiber Erosion Control Blanket
- Straw Erosion Control Blanket
- Polypropylene Erosion Control Blanket

Payment at the contract price for the above tender item(s) shall be full compensation for all labour, equipment and material to do the work.

9.0 WARRANTY

SECTION 10 - TURBIDITY CURTAIN

1.0 DESCRIPTION

This item of work shall consist of the supply, installation, maintenance and removal of turbidity curtains.

2. 0 REFERENCES

All reference standards shall be current issue or latest revision at the first date of tender advertisement. This specification refers to the following standards, specifications or publications:

- ASTM D 4632, Test Method for Determining Grab Tensile Strength.
- ASTM D 4751 (FOS), Test Method for Determining the Filtration Opening Size (FOS) of Geosynthetic.
- Drawings HS709.DWG. and HS710.DWG.

3.0 SUBMISSIONS AND DESIGN REQUIREMENTS

4.0 MATERIALS

Turbidity curtains shall consist of turbidity curtain geosynthetic, load line, floatation, ballast, anchors, mooring buoys, mooring lines, adjustment lines, and tie-downs.

4.1 Geosynthetic Curtain. Turbidity curtain geosynthetics shall have the following properties:

- be a non-woven or woven material such that the opening size cannot be enlarged under pressure or by being snagged.
- a filtration opening size (FOS) of 220 μm, maximum, for non-woven geotextiles, and a FOS of 425 μm, maximum, for woven geotextiles when tested in accordance with ASTM 4751 (FOS).

4.2 Fabric Strength. The following guide for the configuration of the turbidity curtain can be used. The configuration should vary with exposure conditions.

Suggested Grab Tensile Strength, Minimum Average Roll Value (MARV), N

400	700	1000	1400

	Exposure Conditions	
Calm	→	Rough
Sheltered	→	Exposed
Short duration	→	Long Duration
No flow	→	Very Low Flow
Shallow (1-3m)	→	Deep (10 m +)
	Chain	
CHAIN 8 mm	→	10 mm
	Buoyancy x-Section	
MIN 75 cm^2	→	150 cm^2

In a reasonably exposed area that is shallow but curtain will be there for 6 months or more the 1000 to 1400N fabric should be used. In calm, short duration applications that are deep (8 m) then a 400 or 700N fabric should be used. There is no absolute rule.

4.3 Floatation. Turbidity curtain floatation material shall be a material which has sufficient buoyancy to provide the curtain with continuous support, and a minimum of 100 mm freeboard. The sections of floatation shall be installed such that they can not move along inside the sleeve and they shall not be more than twice the thickness of the floatation apart.

4.4 Load Lines. Load lines shall be minimum 8 mm steel cable, or rope of equal strength.

4.5 Ballast. Ballast shall be minimum 8 mm steel chain.

4.6 Anchors. Turbidity curtain anchors shall have a minimum mass of 34 kg for firm mud bottoms or self burying anchors with a minimum mass of 5 kg for sandy bottoms.

4.7 Mooring Buoys. Mooring buoys shall have provision for the mooring line to be securely attached and be sufficiently buoyant to remain afloat under normal load conditions.

4.8 Mooring Lines. Adjustment lines shall be minimum 13 mm nylon rope.

5.0 CONSTRUCTION METHODS

5.1 Turbidity Curtains. Turbidity curtains shall be constructed as follows:

- The turbidity curtain shall have sleeves formed along the top and bottom edges. The top sleeve shall contain the load line and the floatation, and the bottom sleeve shall contain the ballast. The bottom sleeve shall be reinforced with 550 g PVC if the curtain is to be deployed for longer than 2 weeks or if it is in an exposed location.
- Where the turbidity curtain is joined to provide a continuous run, the sections shall be connected to provide a continuous seal.
- The turbidity curtain shall be of sufficient width taking

into account water depth and wave action.

- Adjustment lines, when required, shall be used at 10 m intervals maximum and encircle the turbidity curtain from top to bottom.
- The turbidity curtain shall be prepared for installation by rolling up and binding with ties every 1.5 m for the entire length of curtain.

5.2 Installation

Turbidity curtains shall be installed as follows:

- Anchor locations shall be established by the installer as necessary to maintain the turbidity curtain in place. The number and size of the anchors and their location to be determined by the size of the curtain and its location (sheltered or exposed) and the duration for which it will be deployed.

  Turbidity curtains shall be installed to prevent sediment passage from the area enclosed by the curtain to the remaining water body. Turbidity curtains shall only be installed and maintained in a manner that avoids entry of equipment, other than hand-held equipment and boats, to the remaining water body. The sequence of installation shall be as follows:
- One end of the curtain shall be firmly attached to the upstream tie-down.
- The curtain shall be launched and placed as specified.
- The remaining end of curtain shall be attached to the downstream tie-down.
- Each anchor shall be attached to the turbidity curtain load line with a mooring line.
- At inflection points, the mooring buoys shall be attached to the mooring line at a distance 1 m from the load line.
- The ties, if used, shall be removed from the curtain to allow the turbidity curtain ballast to sink to its maximum depth.

- The location and depth of the ballast shall be adjusted as necessary by using the adjustment lines.

  Equipment is permitted to work in the area enclosed by the turbidity curtain.

  The curtain shall be kept free of tears and gaps and the bottom edge of curtain shall be continuously in contact with the water course bed so that sediment passage from the enclosed area is prevented. The entire top edge of the curtain shall be maintained such that it is always above the water surface.

6.0 QUALITY CONTROL / QUALITY ASSURANCE

7.0 METHOD OF MEASUREMENT

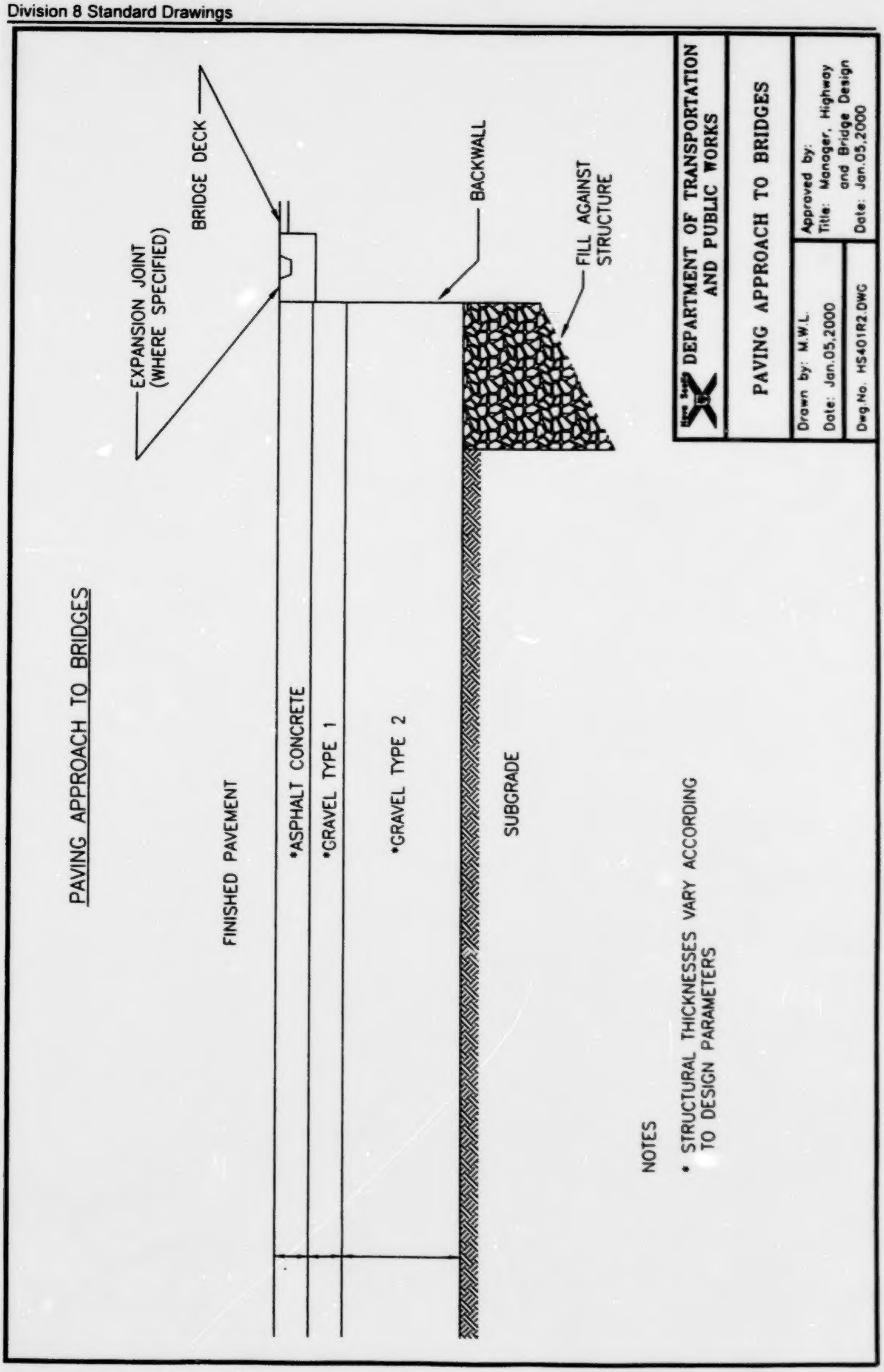
Measurement for turbidity curtains shall be by the metre of curtain installed, from tie-down to tie-down.

8.0 BASIS OF PAYMENT

Payment at the contract unit price for the above tender item shall be full compensation for all labour, equipment and material required to do the work. Partial payment will be made on the following basis:

- 70% for installation
- 30% for maintenance and removal

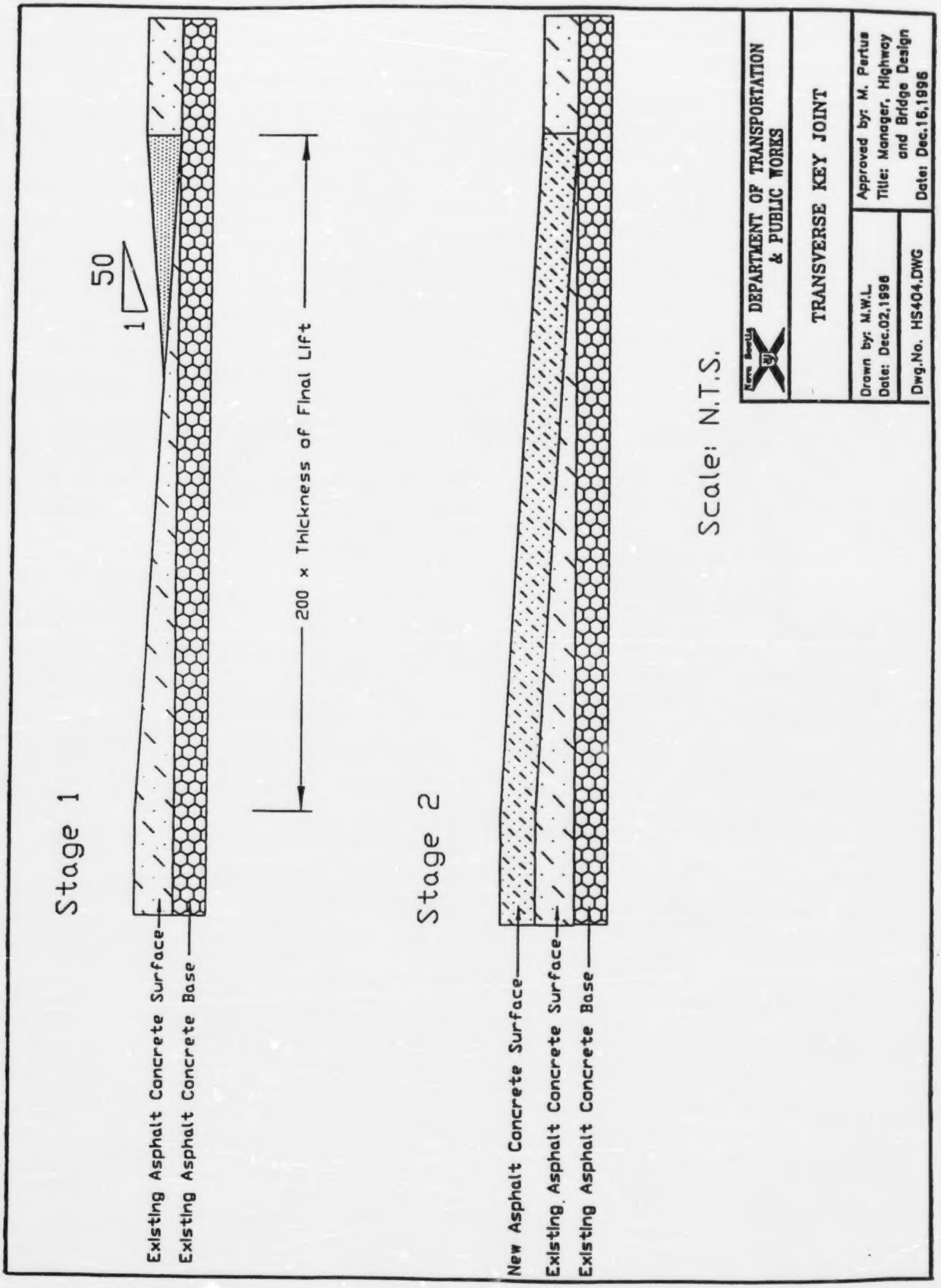
9.0 WARRANTY



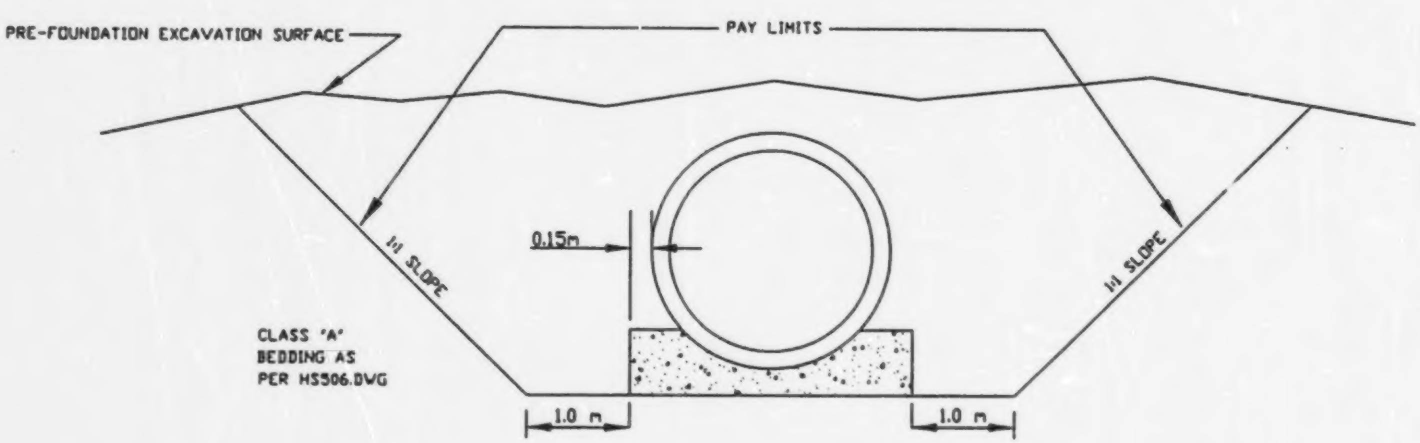
PAVING APPROACH TO BRIDGES

NOTES

- * STRUCTURAL THICKNESSES VARY ACCORDING TO DESIGN PARAMETERS


Stage 1
Stage 2
50
1
200 × Thickness of Final Lift
Existing Asphalt Concrete Surface
Existing Asphalt Concrete Base
New Asphalt Concrete Surface
Existing Asphalt Concrete Surface
Existing Asphalt Concrete Base
Scale: N.T.S.
Nova Scotia
DEPARTMENT OF TRANSPORTATION & PUBLIC WORKS
TRANSVERSE KEY JOINT
Drawn by: M.W.L.
Date: Dec.02,1996
Approved by: M. Pertus
Title: Manager, Highway and Bridge Design
Dwg.No. HS404.DWG
Date: Dec.16,1996

EXCEPT IN THOSE CASES WHERE DIMENSIONS FOR EXCAVATION ARE INDICATED ON INDIVIDUAL PLANS, THE DIMENSIONS USED IN COMPUTING THE SECTIONAL AREA OF FOUNDATION EXCAVATION FOR TIMBER STRUCTURES OR STRUCTURES OF ALL SIZES REQUIRING CAST IN PLACE CONCRETE WILL BE AS SHOWN ON THE FOLLOWING CROSS SECTION.

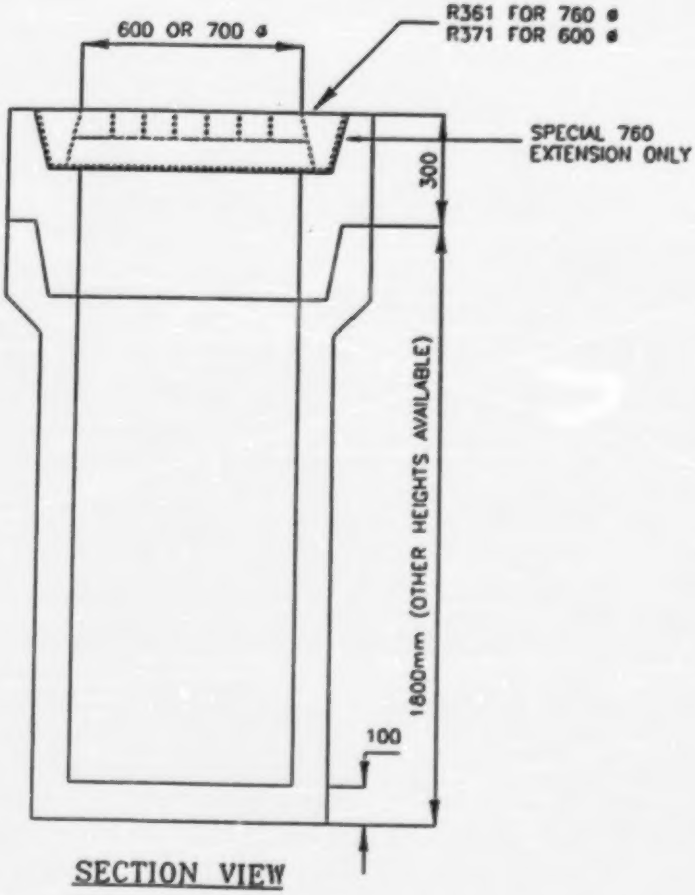


THIS CROSS SECTION REPRESENTS MAXIMUM PAY LIMITS FOR FOUNDATION EXCAVATION. IF THE BOTTOM WIDTH OF THE EXCAVATION IS LESS OR IF THE SIDE SLOPES ARE STEEPER THAN INDICATED ON THE CROSS SECTION ,THE SECTIONAL AREA WILL BE COMPUTED ACCORDINGLY.

Nova Scotia DEPARTMENT OF TRANSPORTATION
AND PUBLIC WORKS

FOUNDATION EXCAVATION FOR TIMBER STRUCTURES OR ANY STRUCTURES THAT REQUIRE CAST IN PLACE CONCRETE (INCLUDING FOOTINGS OR BEDDING)

Drawn by: M.W.L.	Approved by: M. Pertus
Date:April17,2000	Title: Manager, Highway and Bridge Design
Dwg.No. HS203.DWG	Date: April17,2000



SECTION VIEW

NOTES:

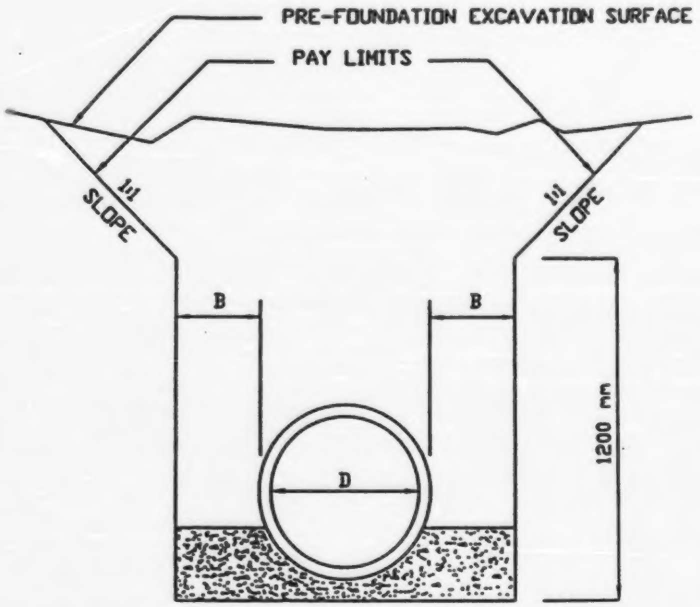
1. MINIMUM SUMP 450mm.
2. 1 LEAD ONLY.
3. MAXIMUM LEAD SIZE 375mm.
4. REQUIRED COVER R361 (760mm dia.) OR
   COVER R371 (600mm dia.) OR EQUIVALENTS.
5. IT IS SUGGESTED THAT THIS CATCH BASIN BE USED BEHIND
   CURBS (ie. GRASS BOULEVARD).

NOTE: ALL DIMENSIONS ARE IN MILLIMETRES.

DEPARTMENT OF TRANSPORTATION
AND PUBLIC WORKS

TYPICAL 600 OR 700mm dia.
CATCH BASIN

Drawn by: M.W.L.	Approved by: M. Perlus
Date:Dec.02,1996	Title: Manager, Highway and Bridge Design
Dwg.No. HS507.DWG	Date: Dec.16,1996



CLASS 'B' OR 'C'
BEDDING AS PER
HS506.DWG

PIPE DIAMETER, D (INSIDE), mm	DIMENSION B, mm
UP TO 500	300
501 TO 1200	400
OVER 1200 OR ANY OTHER PRECAST SECTION	500

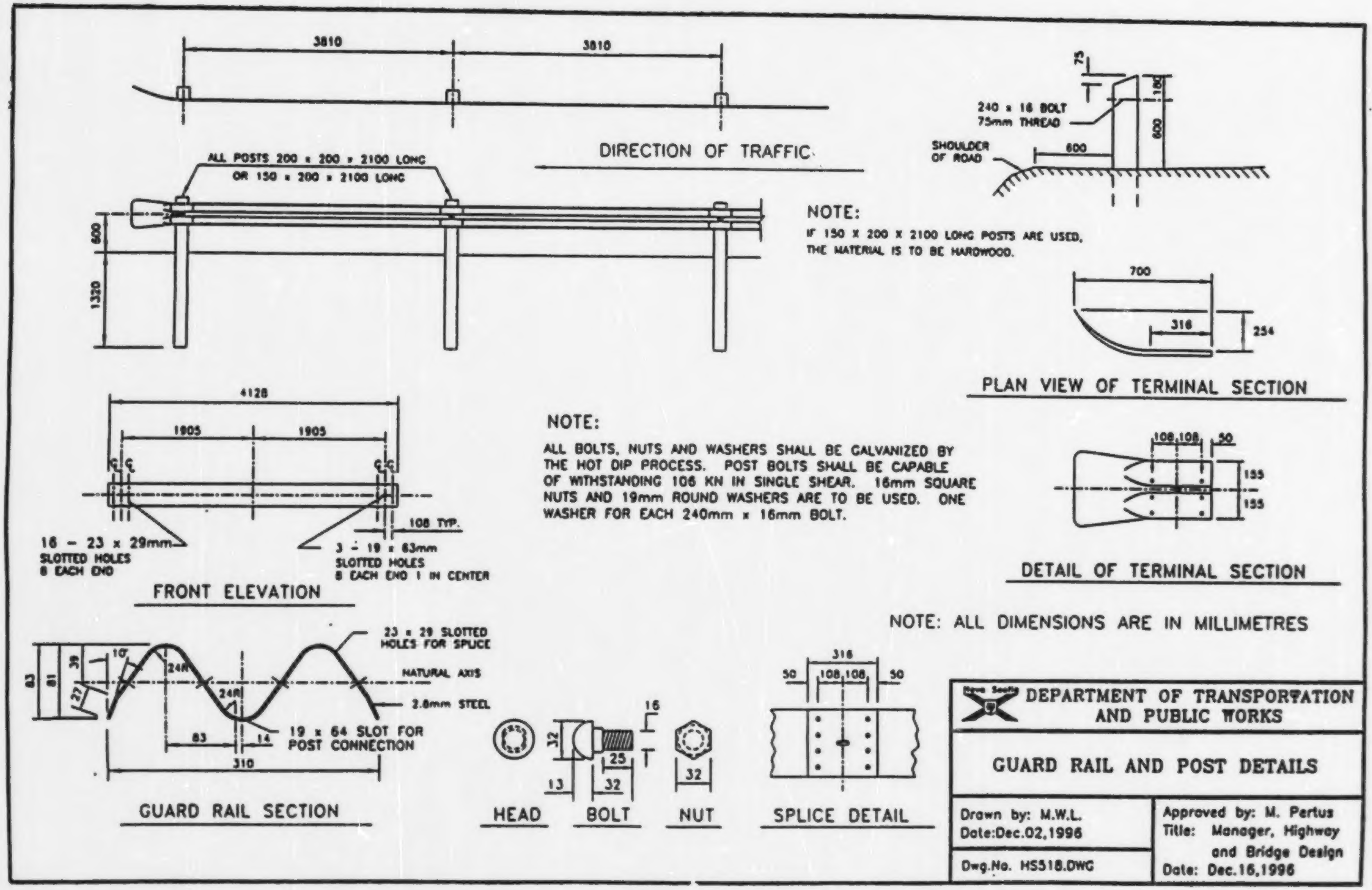
This cross section represents maximum pay limits for foundation excavation.
If the bottom width of the excavation is less or
if the sideslopes are steeper than indicated on the
cross section, the sectional area will be computed accordingly.

Nova Scotia DEPARTMENT OF TRANSPORTATION
AND PUBLIC WORKS

**FOUNDATION EXCAVATION LIMITS
FOR PRE-CAST STRUCTURES**

Drawn by: M.W.L.
Date: April 17, 2000
Dwg.No. HS528R.DWG

Approved by: M. Pertus
Title: Manager, Highway and Bridge Design
Date: April 17, 2000



NOTE:
IF 150 X 200 X 2100 LONG POSTS ARE USED, THE MATERIAL IS TO BE HARDWOOD.

NOTE:
ALL BOLTS, NUTS AND WASHERS SHALL BE GALVANIZED BY THE HOT DIP PROCESS. POST BOLTS SHALL BE CAPABLE OF WITHSTANDING 106 KN IN SINGLE SHEAR. 16mm SQUARE NUTS AND 19mm ROUND WASHERS ARE TO BE USED. ONE WASHER FOR EACH 240mm x 16mm BOLT.

NOTE: ALL DIMENSIONS ARE IN MILLIMETRES

DEPARTMENT OF TRANSPORTATION
AND PUBLIC WORKS

GUARD RAIL AND POST DETAILS

Drawn by: M.W.L.
Date:Dec.02,1996

Dwg.No. HS518.DWG

Approved by: M. Pertus
Title: Manager, Highway and Bridge Design
Date: Dec.16,1996

TENDER NO. PROJECT NO.

Specification (A)		Unit (B)	Estimated Quantity (C)	Unit Price Written Words (D)	Unit Price Figures (E)	Extension (F)
2.03.05	Ditching (Spec. Prov.)	metre				
2.05	Borrow (Div. 2 Sec. 5)	cubic metre				
2.08	Compaction (Div. 2 Sec. 8)	cubic metre				
2.09	Water for Compaction & Dust Control (Div. 2 Sec. 9)	kilolitre				
2.10	Rough Grading (Div. 2 Sec. 10)	square metre				
2.11	Fine Grading (Div. 2 Sec. 11)	square metre				
2.12.01	Foundation Excavation Common (Div. 2 Sec. 12)	cubic metre				
2.12.02	Foundation Excavation Solid Rock (Div. 2 Sec. 12)	cubic metre				
2.13.01	Foundation Excavation Common for Bridges (Div. 2 Sec. 13)	cubic metre				

CARRIED FORWARD $	

Note ! Column "D" to be completed in written form. Column "E" to be completed in numerical form . Column "F" to be completed in numerical form.

WHERE THERE IS A CONFLICT WRITTEN WORD WILL GOVERN

TENDER NO. PROJECT NO.

Specification (A)	Unit (B)	Estimated Quantity (C)	Unit Price		Extension (F)
			Written Words (D)	Figures (E)	
2.13.02 Foundation Excavation Solid Rock for Bridges (Div. 2 Sec. 13)	cubic metre				
2.15.01 Overhaul 300m - 599 (Div.2 Sec.3)	cubic metre		FIFTY CENTS	0.50	
2.15.02 Overhaul: 600m - 899m (Div. 2 Sec. 3)	cubic metre		SIXTY-ONE CENTS	0.61	
2.15.03 Overhaul: 900m -1199m (Div. 2 Sec. 3)	cubic metre		SEVENTY-TWO CENTS	0.72	
2.15.04 Overhaul: 1200m - 1499m (Div. 2 Sec. 3)	cubic metre		ONE DOLLAR AND ONE CENTS	1.01	
2.15.05 Overhaul: 1500m - 1799m (Div. 2 Sec. 3)	cubic metre		ONE DOLLAR AND EIGHTEEN CENTS	1.18	
2.15.06 Overhaul: 1800m - 3199m (Div. 2 Sec. 3)	cubic metre		ONE DOLLAR AND FIFTY-NINE CENTS	1.59	
2.15.07 Overhaul: 3200m - 4799m (Div. 2 Sec. 3)	cubic metre		ONE DOLLAR AND NINETY-EIGHT CENTS	1.98	
2.15.08 Overhaul: 4800m - 6399m (Div. 2 Sec. 3)	cubic metre		TWO DOLLARS AND THIRTY-SEVEN CENTS	2.37	
3.01 Gravel Borrow (Div. 3 Sec. 1)	tonne				
				CARRIED FORWARD $	

Note ! Column "D" to be completed in written form. Column "E" to be completed in numerical form . Column "F" to be completed in numerical form.

WHERE THERE IS A CONFLICT WRITTEN WORD WILL GOVERN

TENDER NO. PROJECT NO.

Specification (A)	Unit (B)	Estimated Quantity (C)	Unit Price Written Words (D)	Unit Price Figures (E)	Extension (F)
				BROUGHT FORWARD $	
7.11 Water Control at Culvert Extensions or Installations (Div. 7 Sec. 11)	lump sum				
7.12 Dewatering with Filter Bags (Div. 7 Sec. 12)	lump sum				
7.13 Sodding (Div. 7 Sec. 13)	square metre				
7.14 Lime (Div.7 Sec.14)	tonne				
				CARRIED FORWARD $	

Note ! Column "D" to be completed in written form. Column "E" to be completed in numerical form . Column "F" to be completed in numerical form.

WHERE THERE IS A CONFLICT WRITTEN WORD WILL GOVERN

Nova Scotia
Department of
Transportation
and Public Works

ACKNOWLEDGEMENT OF TENDER CONTENT FORM

List of Definition of Terms, Department of Transportation and Public Works Standard Specification dated February 1, 1997 and the attached Tenders and Special Provisions, referred to in Paragraph 10 of Agreement

dated ....

BETWEEN

....
CONTRACTOR

and her Majesty the Queen, in the Right of Her Province of Nova Scotia as represented in this behalf by the Honourable Minister of Transportation and Public Works.

DESIGNATION	NAME	DATE
Division 1. Section 1	Definition of Terms	February 1, 2000
Division 1. Section 2	Instructions to Bidders	February 1, 2001
Division 1. Section 3	Agreement	February 1, 2001
Division 1. Section 4	General Provisions	February 1, 2001
Division 1. Section 5	Environmental Protection	February 1, 1997
Division 2. Section 1	Clearing	February 1, 1997
Division 2. Section 2	Grubbing	February 1, 2000
Division 2. Section 3	Roadway and Drainage Excavation	February 1, 2000
Division 2. Section 4	Disposal of Surplus Material	March 1, 1998
Division 2. Section 5	Borrow	February 1, 2000
Division 2. Section 6	Subgrade	March 1, 1998
Division 2. Section 7	Shoulders	February 1, 1999
Division 2. Section 8	Compaction	February 1, 1997
Division 2. Section 9	Water for Compaction & Dust Control	February 1, 1999
Division 2. Section 10	Rough Grading	February 1, 1999
Division 2. Section 11	Fine Grading	February 1, 1999
Division 2. Section 12	Foundation Excavation	February 1, 2001
Division 2. Section 13	Foundation Excavation for Bridges	March 1, 1998
Division 3. Section 1	Gravel Borrow	February 1, 1997
Division 3. Section 2	Gravel Type 1, 1S, 2 & M	February 1, 2001
Division 3. Section 3	Iron-Blast Furnace Slag	February 1, 1997
Division 3. Section 4	Clear Stone	March 1, 1998

ESIGNATION	NAME	DATE
Division 3. Section 5	Compaction of Gravels	February 1, 1997
Division 3. Section 6	Loose Laid Rip-Rap	February 1, 1997
Division 3. Section 7	Hand Laid Rip-Rap	February 1, 1997
Division 3. Section 8	Armour Rock	February 1, 1997
Division 3. Section 9	Rock Fill	February 1, 1997
Division 3. Section 10	Fill Against Structure	March 1, 1998
Division 3. Section 11	Unshrinkable Backfill	February 1, 1997
Division 4. Section 1	Emulsified Asphalt	February 1, 1999
Division 4. Section 2	Performance Graded Asphalt Binder (PGAB)	February 1, 2001
Division 4. Section 3	Asphalt Concrete Curbs & Gutters	February 1, 1997
Division 4. Section 4	Asphalt Concrete Hot Mix-Hot Placed	February 1, 2001
Division 4. Section 5	Liquid Asphalt Primer	February 1, 1997
Division 4. Section 6	Removal of Asphalt Concrete	February 1, 1997
Division 4. Section 7	Asphalt Concrete Patching	February 1, 2001
Division 4. Section 8	Asphalt Concrete Paving of Bridge Decks	February 1, 1997
Division 4. Section 9	Graded Aggregate Seal (Two Courses)	February 1, 1997
Division 4. Section 10	Graded Aggregate Seal (One Course)	February 1, 1997
Division 4. Section 11	Crack Filling and Crack Sealing - (EPWS)	February 1, 1997
Division 4. Section 12	Seal Coat - (EPWS)	February 1, 1997
Division 4. Section 13	Reclaimed Asphalt Concrete	February 1, 1997
ivision 4. Section 14	Sand Seal Surface Treatment	February 1, 1997
Division 4. Section 15	Cold Mix for Winter Patching	February 1, 2000
Division 4. Section 16	Micro-surfacing - (EPWS)	February 1, 2001
Division 4. Section 17	Concrete Pavement	February 1, 1997
Division 4. Section 18	Roller Compacted Concrete	March 1, 1998
Division 5. Section 1	Piles	February 1, 1997
Division 5. Section 2	Timber Structures	February 1, 1997
Division 5. Section 3	Structural Steel	February 1, 1997
Division 5. Section 4	Miscellaneous Metal	February 1, 1997
Division 5. Section 5	Reinforcing Steel	March 1, 1998
Division 5. Section 6	Steel Guard Rail Systems and Wooden Guide Posts	February 1, 1997
Division 5. Section 7	Cast In Place Concrete	February 1, 2001
Division 5. Section 8	Precast, Prestressed Concete Girders	February 1, 1997
Division 5. Section 9	Waterproofing Concrete Bridge Decks	February 1, 1997
Division 5. Section 10	Structural Plate Pipe	February 1, 1997
Division 5. Section 11	Aluminum Guardrail	February 1, 1997
Division 5. Section 12	Underground Drainage Systems	February 1, 1997
Division 5. Section 13	Concrete Restoration	February 1, 2000
Division 5. Section 14	Inextensible Mechanical Stabilized Earth (MSE) Structures	March 1, 1998
Division 5. Section 15	Asphaltic Plug Joints	February 1, 2000
Division 6. Section 1	Traffic Control Persons	February 1, 1997
ivision 6. Section 2	Flashing Light Units	February 1, 1997
Division 6. Section 3	Chain Link Fence	February 1, 1997

DESIGNATION	NAME	DATE
Division 6. Section 4	Right-Of-Way-Fence	February 1, 1997
Division 6. Section 5	Removal of Existing Sidewalks, Driveways and Curbs	February 1, 1997
Division 6. Section 6	Supply and Application of Non-Coning Traffic Paint	February 1, 1997
Division 6. Section 7	Calcium Chloride Water Solution	February 1, 1997
Division 6. Section 8	Calcium Chloride	February 1, 1997
Division 6. Section 9	Sodium Chloride	February 1, 1997
Division 6. Section 10	Winter Sand	February 1, 1999
Division 7. Section 1	Sediment Barriers	February 1, 1997
Division 7. Section 2	Flow Checks	February 1, 2000
Division 7. Section 3	Settlement Ponds	February 1, 2000
Division 7. Section 4	Maintenance and Sediment Control	February 1, 1997
Division 7. Section 5	Hydroseeding	February 1, 2000
Division 7. Section 6	Mulching	February 1, 1997
Division 7. Section 7	Erosion Control Blankets	February 1, 2000
Division 7. Section 8	Topsoil	February 1, 1997
Division 7. Section 9	Water Control for Bridge Foundations	February 1, 1997
Division 7. Section 10	Turbidity Curtain	February 1, 2000
Division 7. Section 11	Water Control at Culvert Extensions or Installations	February 1, 1997
Division 7. Section 12	Dewatering With Filter Bags	February 1, 1997
Division 7. Section 13	Sodding	February 1, 1997
Division 7. Section 14	Lime	February 1, 2000

The undersigned bidder hereby declares that the Special Provisions and the Province of Nova Scotia Department of Transportation and Public Works Standard Specification's dated March 1, 1998 relating to this contract and listed above have been carefully read and understood. It is mutually agreed that submission of a bid shall be considered prima facie evidence that the bidder has made such examination and is satisfied as to the conditions of the Standard Specification, Special Provisions and Contract.

IN WITNESS WHEREOF the Parties hereto have herewith caused These Presents to be signed and sealed on the day and year first above written.

SIGNED, SEALED AND DELIVERED
by the Contractor

__________________________ in the Presence of __________________________
CONTRACTOR WITNESS

Nova Scotia
Department of
Transportation
and Public Works

RELEASE OF SECURITY DEPOSIT FORM
AFFIDAVIT OF PAYMENT

I, ______________________________ of ____________________________________, in
(Contractor) (Location)

the Province of ______________________________________, make oath and say as follows:

1. That I am the ________________________ of __________________________________, the
(Office Held) (Company Name)
contractor in Project Number 98- XXX between the Department of Transportation and Public Works for the Province of Nova Scotia and _____________________.
(Company Name)
2. That all subcontractors and suppliers who have done work for and supplied materials for Project Number 98-XXX have completed their work and supplied all materials they have agreed to supply.
3. That all subcontractors and suppliers for Project Number 98-XXX have submitted invoices for and have been paid for the work performed by and the materials supplied by them.
4. That there are no outstanding claims by subcontractors and suppliers relating to Project Number 98-XXX.

ORN BEFORE ME AT _____________________
(Location)

in the County of ____________________________

and the Province of __________________________

this _________ day of _____________, A.D., 19___ .

____
(Signature of Notary Public, Commissioner of the Supreme Court of N.S., etc.)

____
(Contractors Signature)

By my/our signature hereunder I/we hereby identify this as the Release of Security Deposit Form referred to in this Contract executed by me/us and bearing

dated the .... day of

...A.D., 19.....

..
(Contractor Signature)

STATEMENT OF ASPHALT CEMENT - LIQUID, ASPHALT - PRIMER & EMULSIFIED ASPHALT - TACK

TO THE DEPARTMENT OF TRANSPORTATION AND PUBLIC WORKS
HALIFAX, NOVA SCOTIA

Bidder:

As a supplement to my/our Tender: **PROJECT NO. 98-XXX TENDER NO. xxxxxxx**
SECTIONS, KILOMETRES

I/We herewith submit the following statement of my/our source of asphalt cement, primer and emulsified asphalt, which will enable me/us to prosecute and complete the work satisfactorily if awarded the project.

ASPHALT CEMENT

(REFINERY NAME)	(LOCATION)
PRICE QUOTATION FROM SUPPLIER (Price $/Metric Tonne)	SPECIFIED TIME OF COMPLETION

PRIMER

(REFINERY NAME)	(LOCATION)
PRICE QUOTATION FROM SUPPLIER (Price $/Litre)	SPECIFIED TIME OF COMPLETION

EMULSIFIED ASPHALT - TACK

(SUPPLIER)	(LOCATION)

Respectfully submitted,

(ATTACHED WRITTEN PRICE QUOTATIONS FROM SUPPLIER)

ENGINEER'S CERTIFICATE OF FINAL ESTIMATE

TO: The Honorable Minister of Transportation and Public Works of Nova Scotia

RE: Agreement made the _______ day of_____________by and between the Department of Transportation and Public Works

and ________________________________(Contractor) covering the following:

Contract:___________ _____sections in ____________County.

Section 1:

Section 2:

I hereby certify that the above noted contract has been inspected on behalf of the **Engineer** and it was found that the Contractor has completed **the work** and therefore, recommend to the Minister that the final estimate be paid to __________ (Contractor) ___________________in accordance with the terms of the contract.

The only known recoverables are as outlined in the letter attached, dated _________, 20___
and signed by ________________________________Project Engineer.

CERTIFICATE DATED___________, 20____

SIGNATURE__________________________
District Director

CC: Contractor_______________________

NOVA SCOTIA
DEPARTMENT OF
TRANSPORTATION
AND PUBLIC WORKS

Modification of Tender

Please be advised that the following changes are requested as per

Project Number ____________________

Tender Number ____________________

Date ____________________

Sect. No.	Item No.	Item Description	Quantity (from Tender Document)	Unit Price Change		Extension (Quantity x Increase/Decrease)
				Increase	Decrease	
					Total Extended Difference	

As indicated above I/we wish to change my/our tender price by the following

amount $______________
(NUMERALS)

____
(WRITTEN WORDS)

____
Contractors Signature

____
Company or Contractor's Name

NOVA SCOTIA DEPARTMENT OF THE ENVIRONMENT

PIT & QUARRY GUIDELINES

Revised May 1999

I. DEFINITIONS

Abandonment	Means cessation of production of aggregate for a period of 12 months.
Active Area	Active area shall be considered the area required to operate a pit of quarry. This includes the site "working face" and associated works.
Administrator	Means a person appointed by the Minister, and includes an acting administrator.
Aggregate	Is all consolidated and unconsolidated material excluding, gypsum, limestone, peat or minerals as defined under the *Mineral Resources Act*.
Associated Works	Means any building, structure, processing facility, pollution abatement system or stockpiles of aggregate.
Department	The Nova Scotia Department of the Environment
Disturbed Area	Any area on a pit or quarry site that has been stripped of vegetation and is susceptible to erosion.
Liquid Effluents	Storm run-off, wash water, or any other liquid waste.
Minister	The Honourable Minister of the Environment for the Province of Nova Scotia.
Pit	An excavation made for the purpose of removing aggregate without the use of explosive.
Quarry	An excavation, requiring the use of explosives, made for the purpose of removing consolidated rock from the environment.
Rehabilitation	Restorative work performed or to be performed in accordance with the approved rehabilitation plan.
Rehabilitation Plan	Is a written plan approved by the Department to provide for partial or total abandonment of the pit or quarry and may include an initial rehabilitation plan, progressive rehabilitation or a final rehabilitation plan.
Scrap	All waste material including rejected metal, lumber and tree stumps.
Watercourse	Is the bed and shore of every river, stream, lake, creek, pond, spring, lagoon, or other natural body of water, and the water therein, within the jurisdiction of the Province, whether it contains water or not, and all ground water.

II. Application

(1) These guidelines apply to all pit and quarry operations as defined under Division V part 2 (e) and (f) of the Activities Designation Regulations.

(2) Notwithstanding subsection II (1), an approval is not required in relation to

(a) pit and quarry operation, where the aggregate is utilized for public purposes by or for the Department of Transportation & Public Works;

(b) land being cut for road or highway construction; or

(c) where the primary purpose of aggregate removal is for development and not for aggregate production.

(3) With respect to operations noted in II (2) (a) the Department of Transportation & Public Works shall ensure these operations adhere to these guidelines. However, the Department of the Environment will have the final authority on any matter relating to interpretation and enforcement.

III. Separation Distances For Pit Operations

(1) No person responsible for the operation of a pit shall locate the active area within:

(a) 30 m of the boundary of a public or common highway unless the person has consent from the Department of Transportation & Public Works to operate closer;

(b) 30 m of the bank of any watercourse or ordinary high water mark;

(c) 30 m of the boundary of the pit property;

(2) No person responsible for the operation of a pit shall locate the excavation "working face" of the pit within:

(a) 30 m of the boundary of a public or common highway unless the person has consent from the Department of Transportation & Public Works;

(b) 30 m of the bank of any watercourse or ordinary high water mark;

(c) 90 m of the foundation or base of a structure located off site. Structure includes but is not limited to a private home, a cottage, an apartment building, a school, a church, a commercial building or, a treatment facility associated with the treatment of municipal sewage, industrial or landfill effluent, an industrial building or structure, a hospital and a nursing home, etc.*

(d) 15 m of the property boundary when a structure on the abutting property is not involved.

NOTE* This distance is measured from the working face of the pit to the foundation or base of the structure. This distance can be reduced with written consent from all individuals owning structures within 90 m.

IV. Separation Distances for Quarry Operations

(1) No person responsible for the operation of a quarry shall locate the associated works within:

(a) 30 m of the boundary of a public or common highway unless the person has written consent from the Department of Transportation & Public Works to operate closer;

(b) 30 m of the bank of any watercourse or the ordinary high water mark;

(c) 30 m of the boundary of the property on which the quarry is located;

(2) No person responsible for the operation of a quarry shall blast within:

(a) 30 m of the boundary of the public or common highway unless the person has written consent from the Department of Transportation & Public Works;

(b) 30 m of the bank of any watercourse or the ordinary high water mark;

(c) 800 m of the foundation or base of a structure located off site. Structure includes but is not limited to a private home, a cottage, an apartment building, a school, a church, a commercial building, a treatment facility associate with the treatment of municipal sewage, industrial or landfill effluent, an industrial building or structure, a hospital, nursing home etc.*

(d) 15 m of the property boundary when a structure on the abutting property is not involved.

NOTE:* The separation distance is measured from the working face and point of blast to the foundation or base of the structure. This distance can be reduced with written consent from all individuals owning structures within 800 m.

V. Liquid Effluent Discharge Levels

(1) All storm run-off from the operating site and all liquid effluents resulting from the operation shall be collected and treated to meet the following suspended solids concentrations prior to discharge into a watercourse or beyond the property boundaries:

(a) Maximum suspended solids concentration in any grab sample - 50 mg/l;

(b) Maximum arithmetic monthly average suspended solids concentration - 25 mg/l;

(2) All wash water systems shall be arranged in closed circuit.

VI. Suspended Particulate Lvels

(1) If requested by NSDOE dust emission and particulate matter shall be monitored at a monitoring point located beyond the property boundary of the pit or quarry and shall not exceed the following limits at or beyond the property boundary:

Parameter	**Max. Limit**
Suspended Particulate	60-70 $\mu g/m^3$ annual geometric mean 120 $\mu g/m^3$ average concentration over a 24 hour period

(2) Suspended Particulate Matter shall be measured by the High Volume Method as described in Report No. E.P.S. 1-AP-73-2.

(3) Monitoring stations shall be located on the property line of the site being monitored, or at other Icoations as directed by the Minister or Administrator.

VII. Sound Level Limits

(1) The following sound level limits shall be observed at the property boundaries of the pit or quarry:

Leq. Sound Level Limits *

"Night"	**"Evening"**	**"Day"**
55 dBA	**60 dBA**	**65 dBA**

Night: 23:00 - 08:00, All Day Sunday and Statutory Holidays

Evening: 19:00 - 23:00 Hours

Day: 07:00 - 19:00 Hours

NOTE:* The equivalent sound level is measured in Terms of dBA. The equivalent sound level, then, takes into account the major factors influencing the effect of noise on man, magnitude, frequency range and time variation.

(2) Monitoring stations shall be located on the property line of the site being monitored or at other locations as directed by the Minister or Administrator.

VIII. Blasting

(1)(a) No person responsible for the operation of a quarry shall permit any blasting on site to exceed the following limits:

Concussion (Air Blast) 128 dBA	Within 7m of the nearest structure not located on the property where the blasting operations occur, or other locations as directed by the Minister or Administrator.
Ground Vibration: 0.5 in./sec. (12.5 mm/s) Peak Particle Velocity	Measured below grade or less than 1m above grade in any part of the nearest structure not

grade in any part of the nearest structure not located on the property where blasting occurs, or other locations as directed by the Minister or Administrator.

(1)(b) No person shall fail to monitor all blasts for the parameters outlined in VIII (1)(a).

(2) Monitoring results shall be forwarded to the Department on a monthly basis unless otherwise indicated.

(3) No blasting shall occur on Sunday, on a statutory holiday prescribed by the Province, or on any day between the hours of 1800 hours and 0800 hours.

(4) Every person responsible for the operation of quarry shall have a technical blast design prepared by a qualified person which ensures the ground vibration and air concussion outlined in VIII(1) can be achieved.

(5) Every person responsible for the operation of a quarry shall conduct a pre-blast survey of all structures within 800 m of the point of blast. This survey should be conducted in accordance with the Department of the Environment's "Procedure For Conducting a Pre-Blast Survey".

(6) No blasting is to take place if a thermal inversion is anticipated at the time of the proposed blast.

IX. Rehabilitation

(1) Every person responsible for the operation of a pit or quarry shall

(a) within six (6) months of receiving an approval submit an interim security in amounts outlined in the section titled Security X (3) & (4);

(b) before the expiry of the time period referred to in section X (2) the proponent shall post a final security which shall be calculated using the rehabilitation plan and the factors outlined in section X (5)

(c) within twelve (12) months of abandonment of the pit or quarry the site shall be rehabilitated to the satisfaction of the department and in accordance with an approved rehabilitation plan.

X. Security

(1) Every person responsible for the operation of a pit or quarry shall post a security in accordance with the provision of Section 13 of the Approvals Procedure Regulation and Section 57 of the Environment Act.

(2) The Proponent shall post an interim security in the amounts noted in sections (3) & (4) until a final calculation referred to in section (5) is calculated. The interim security shall not exceed one (1) year unless otherwise agreed upon in writing by the Administrator.

(3) The amount of security for a pit shall be $6250.00/ha ($2500.00/acre) of disturbed area.

(4) The amount of security for a quarry shall be $6250.00/ha ($2500.00/acre).

(5) Before the expiry of the interim security, the Proponent shall submit a rehabilitation plan. This rehabilitation plan shall include the estimated total cost for labour, equipment, supplies and services to undertake the following activities:

(i) surface contouring;
(ii) establishing proper drainage;
(iii) revegetation work; or
(iv) any work necessary to reclaim the pit or quarry

XI. Protection of Groundwater Resources

Prior to any excavation below the watertable a hydrological study will be required and approval must be obtained from the Minister or Administrator.

DATED at Halifax, Nova Scotia, this 4th day of May, 1999.

George Fox
Deputy Minister

1.0 OVERHAUL RATES

Haul, m	$ per m^3
300 - 599	0.50
600 - 899	0.61
900 - 1199	0.72
1200 - 1499	1.01
1500 - 1799	1.18
1800 - 3199	1.59
3200 - 4799	1.98
4800 - 6399	2.37
For each increment of 1600 m, the rate increases by $0.39 per m^3.	

2.0 GRAVEL IN STOCKPILE

The Contractor is advised that the current rate of $3.02 per tonne will apply to Gravel in Stockpile as referred to in Division 3 Sections 2, 3, and 4, and Division 4 Section 4.

3.0 PILOT VEHICLE

Circumstances may arise in certain signing procedures that warrant the use of a Pilot Vehicle by the Contractor. When the use of a Pilot Vehicle is approved by the Engineer, the rate to be paid for the Pilot Vehicle including the operator and all operating costs, will be $20.50 per hour.

4.0 COLD WEATHER CONCRETE

4.1 Special Protection. $4.84 per cubic metre of concrete placed.

4.2 Special Protection with Insulation. $24.40 per cubic metre of concrete placed.

4.3 Complete Housing with Heat. $49.60 per cubic metre of concrete placed.

5.0 TRUCK RATES

5.1 Cubic Metre Kilometre Rates

Km	$\$/m^3$	Km	$\$/m^3$	Km	$\$/m^3$	Km	$\$/m^3$
1	2.13	26	5.12	51	8.21	76	11.30
2	2.35	27	5.24	52	8.33	77	11.43
3	2.54	28	5.36	53	8.46	78	11.55
4	2.72	29	5.49	54	8.58	79	11.67
5	2.89	30	5.61	55	8.70	80	11.80
6	3.04	31	5.73	56	8.83	81	11.92
7	3.18	32	5.86	57	8.95	82	12.05
8	3.31	33	5.98	58	9.08	83	12.17
9	3.43	34	6.11	59	9.20	84	12.29
10	3.55	35	6.23	60	9.32	85	12.42
11	3.65	36	6.35	61	9.45	86	12.54
12	3.75	37	6.48	62	9.57	87	12.66
13	3.85	38	6.60	63	9.69	88	12.79
14	3.94	39	6.72	64	9.82	89	12.91
15	4.02	40	6.85	65	9.94	90	13.04
16	4.10	41	6.97	66	10.07	91	13.16
17	4.17	42	7.10	67	10.19	92	13.28
18	4.24	43	7.22	68	10.31	93	13.41
19	4.31	44	7.34	69	10.44	94	13.53
20	4.37	45	7.47	70	10.56	95	13.65
21	4.50	46	7.59	71	10.68	96	13.78
22	4.62	47	7.71	72	10.81	97	13.90
23	4.74	48	7.84	73	10.93	98	14.03
24	4.87	49	7.96	74	11.06	99	14.15
25	4.99	50	8.09	75	11.18	100	14.27

ADD 12.37 CENTS PER CUBIC METRE OVER 100 KM

For trucks operating with full loads, the rates will be increased by Ten (10%) Percent for specific rock hauling operations involving quarried rock or uncrushed field stone larger than 0.03 cubic metre.

5.2 Tonne Kilometre Rates - Gravel

Km	$/Tonne	Km	$/Tonne	Km	$/Tonne	Km	$/Tonne
1	1.33	28	3.35	55	5.44	82	7.53
2	1.47	29	3.43	56	5.52	83	7.61
3	1.59	30	3.51	57	5.59	84	7.68
4	1.70	31	3.58	58	5.67	85	7.76
5	1.80	32	3.66	59	5.75	86	7.84
6	1.90	33	3.74	60	5.83	87	7.91
7	1.99	34	3.82	61	5.90	88	7.99
8	2.07	35	3.89	62	5.98	89	8.07
9	2.15	36	3.97	63	6.06	90	8.15
10	2.22	37	4.05	64	6.14	91	8.22
11	2.28	38	4.13	65	6.21	92	8.30
12	2.35	39	4.20	66	6.29	93	8.38
13	2.40	40	4.28	67	6.37	94	8.46
14	2.46	41	4.36	68	6.45	95	8.53
15	2.51	42	4.43	69	6.52	96	8.61
16	2.56	43	4.51	70	6.60	97	8.69
17	2.61	44	4.59	71	6.68	98	8.77
18	2.65	45	4.67	72	6.75	99	8.84
19	2.69	46	4.74	73	6.83	100	8.92
20	2.73	47	4.82	74	6.91		
21	2.81	48	4.90	75	6.99		
22	2.89	49	4.98	76	7.06		
23	2.96	50	5.05	77	7.14		
24	3.04	51	5.13	78	7.22		
25	3.12	52	5.21	79	7.30		
26	3.20	53	5.29	80	7.37		
27	3.27	54	5.36	81	7.45		

+7.73 cents per Tonne over 100 km

5.3 Tonne Kilometre Rates - Asphalt

Km	$/Tonne	Km	$/Tonne	Km	$/Tonne	Km	$/Tonne
1	2.36	28	4.38	55	6.47	82	8.56
2	2.50	29	4.46	56	6.55	83	8.64
3	2.62	30	4.54	57	6.63	84	8.71
4	2.73	31	4.61	58	6.70	85	8.79
5	2.84	32	4.69	59	6.78	86	8.87
6	2.93	33	4.77	60	6.86	87	8.95
7	3.02	34	4.85	61	6.94	88	9.02
8	3.10	35	4.92	62	7.01	89	9.10
9	3.18	36	5.00	63	7.09	90	9.18
10	3.25	37	5.08	64	7.17	91	9.26
11	3.31	38	5.16	65	7.24	92	9.33
12	3.38	39	5.23	66	7.32	93	9.41
13	3.44	40	5.31	67	7.40	94	9.49
14	3.49	41	5.39	68	7.48	95	9.56
15	3.54	42	5.47	69	7.55	96	9.64
16	3.59	43	5.54	70	7.63	97	9.72
17	3.64	44	5.62	71	7.71	98	9.80
18	3.68	45	5.70	72	7.79	99	9.87
19	3.72	46	5.78	73	7.86	100	9.95
20	3.76	47	5.85	74	7.94		
21	3.84	48	5.93	75	8.02		
22	3.92	49	6.01	76	8.10		
23	4.00	50	6.08	77	8.17		
24	4.07	51	6.16	78	8.25		
25	4.15	52	6.24	79	8.33		
26	4.23	53	6.32	80	8.40		
27	4.31	54	6.39	81	8.48		

+7.73 cents per Tonne over 100 km

5.4 Hourly Rate

For all truck/trailer configurations, registered to their maximum allowable weight, payment for all work compensated on an hourly basis shall be at a rate of $15.00 per axle per hour.

6.0 TRUCK RATES - SERVICE TRUCKS

6.1 Service Truck - Including Driver

This rate to be used when other rates do not apply, i.e. partial loads, intermittent use.

Truck one (1) tonne and under - $11.48 per hour
Trucks over one (1) tonne - Minimum hourly rate: $19.26 (3 cubic metres)

6.2 Service Truck- Without Driver

Truck one (1) tonne and under - $5.50 per hour

GLOSSARY OF TERMS

Alkali Aggregate Reactivity (AAR): The reaction of cement alkalis with some forms of silica in fine or coarse aggregates causing disruptive expansion and cracking of concrete.

Anionic: A negatively charged ion in a solution; that portion of a compound which when dissolved (usually in water) tends to move toward the anode under the influence of a direct current.

Asphalt Emulsion: An emulsion of asphalt cement and water which contains a small amount of a surface active agent (emulsifier). Emulsified droplets of asphalt may be of either anionic (negative charge) or cationic (positive charge) type, depending on the surfactant used.

Asphalt Emulsion Prime: An application of a low viscosity asphalt emulsion to an absorbent surface or granular base, in preparation for an asphalt surface course.

Base: Granular materials placed immediately below the pavement.

Cationic: A positively charged ion in a solution; that portion of a compound which when dissolved (usually in water) tends to move toward the cathode under the influence of a direct current.

Cementing Materials: (Portland Cement Concrete) A combination of Portland cement and supplementary cementing materials such as fly ash, blast furnace slag or silica fume.

Chipping Hammers: Electric or pneumatic (air operated) impact hammer tools available with a variety of striking points designed to remove brittle material. Chipping hammers shall not exceed 7 kg.

Cold Weather: Those conditions when the air temperature is at or below 5°C. It is also considered to exist when the air temperature is at or is likely to fall below 5°C within 24 hours after concrete placement. Temperature refers to shade temperature.

Culverts: All waterway structures not defined as bridges and having a least dimension of opening of not less than 300 mm.

Curing: (Portland Cement Concrete) Process of maintaining adequate moisture in concrete for a period of time necessary to develop the desired properties of the concrete.

D-Cracking: (Portland Cement Concrete Pavement) A series of closely-spaced, fine, crescent shaped cracks in the concrete surface usually paralleling a joint or major crack and usually curving across slab corners. For 'D' cracks the crescent is concave in relation to the slab corners or joints.

Deck: That portion of the bridge which directly supports vehicle and pedestrian traffic and includes slab, curbs, gutters, sidewalks and parapets.

Dowel Bars: Smooth round steel bars placed across transverse joints usually at a spacing of 300 mm. These bars provide load transfer while permitting a joint to open and close.

EPWS: End Product Warranty Specification.

Fly Ash: Finely divided residue that results from the combustion of pulverized coal.

Hot Weather: Those conditions when the air temperature is at or above 27°C. It is also considered to exist when the air temperature is at or is likely to rise above 27°C within 24 hours. Temperature refers to shade temperature.

Isolation and Expansion Joints: Joints placed to allow movement of the pavement without damaging adjacent pavements, intersecting streets, drainage structures or other fixed objects.

Jack Hammers: Electric or pneumatic (air operated) impact hammer tools available with a variety of striking points designed to demolish or remove brittle material. Jack hammers shall be 14.0 kg maximum mass.

Layer (Reinforcing Steel): Two or more reinforcing bars placed in a plane parallel to a concrete face.

Load Transfer: (Portland Cement Concrete Pavements) Is the effective transfer of traffic loads from one side of the joint to the other. Load transfer across joints is developed either by aggregate interlock or by using dowel bars.

Longitudinal Joints: (Portland Cement Concrete Pavements) Joints parallel to the pavement centerline that control cracking.

Mat : (Reinforcing Steel) Transverse and longitudinal layers of reinforcing steel tied together.

Non-Structural Concrete: Concrete that is non-reinforced, and used in components that are not designed to withstand heavy loads or that is used as fill material in excavations.

Portland Cement: The product obtained by pulverizing clinker consisting essentially of hydraulic calcium silicates to which calcium sulfate, limestone, water and processing additions may be added at the option of the Manufacturer.

Polymer: A large molecule made by the repetitive combination of a large number of simpler, identical units called monomers.

Ready Mixed Concrete: Concrete that is completely batched at the plant and completely mixed in a truck at the plant, or while in transit.

Reclaimed Asphalt Pavement (RAP): An asphalt pavement that has been scarified and pulverized or crushed. No attempt is made to control gradation, except for maximum particle size. The resulting asphalt aggregate mix may be recycled.

Recycle: The reuse (usually after processing) of a material that has already served its first intended purpose.

Rehabilitation: Any modification, alteration or improvement to a structure or its components which is designed to correct defects or deficiencies.

Roller Compacted Concrete (RCC): RCC is a zero-slump concrete mixture that is mixed in a pug mill or stationary mixer, placed and roller compacted.

Silica Fume: Finely divided residue resulting from the production of silicon or silicon containing alloys.

Single Chip Seal: A wearing surface consisting of a uniform application of a rapid setting (RS or CRS) or medium setting (MS or CMS) or high float asphalt emulsion to a prepared surface followed by a uniform application of cover aggregate, which is then rolled.

Stationary Mixer: A non-mobile mixer installed at a central mix plant for the purpose of mixing concrete.

Straight Edge: The straight edge shall be commercially fabricated metal for the intended purpose and be at least 3 m long. The straight edge shall be free from defects and kept straight and true at all times.

Subbase: Granular materials placed immediately below the base and above the subgrade.

Subgrade: That portion of the roadbed upon which the subbase (or base in the case where subbase granulars are not used) is to be placed.

Substructure: All that part of the structure below the bridge seats or below the springing line of arches. Back walls and parapets of abutments and wing walls shall be considered as part of the substructure.

Superstructure: All that part of the structure above the bridge seats or above the springing lines of arches, including the flooring, and not included in the substructure.

Surface Treatment: A chip seal applied to a prepared consolidated gravel, crushed stone, water bound macadam, stabilized soil or similar base.

Tack Coat: A spray application of asphalt emulsion to an existing asphalt or Portland Cement concrete surface prior to an asphalt overlay or patch to provide a bond between new and existing pavement layers.

Tie Bar: Deformed bar placed transverse to longitudinal joint to prevent individual slabs from separating.

Tining: Small grooves of specified dimension which are hand or machine made in the concrete surface in the transverse direction.

Transverse Construction Joints: (Asphalt Concrete Paving) Joints installed at the temporary end of a paving operation. Whenever possible, these joints should be installed at the location of a planned joint.

Transverse Contraction Joints: Joints that are constructed transverse to the centerline and spaced to control cracking from stresses caused by shrinkage, from moisture and thermal changes. Typically transverse contraction joints are oriented at right angles to the centerline and edge of the pavement lanes.

Unshrinkable Backfill: A mixture of aggregate, cement, water and fly ash (when desired) to create a controlled density, low strength, flowable material. Unshrinkable fill is self consolidating and rigid setting and may be substituted for compacted gravel for backfill and structural fills.

WS: Warranty Specification.

Smoothness Testing & Remedial Measures
(Asphalt Concrete; Portland Cement Concrete)

1.0 **Profilograph Surface Test:** The smoothness of the finished surface (top lift) of the pavement will be determined by using a Profilograph over each designated lane. The finished surface (top lift) of the pavement shall be tested and corrected to a smoothness as specified or a price adjustment will apply. All corrections outlined in the following paragraphs shall be made by the contractor at their expense.

1.0.1 Profile Index:

The Profile Index for each lane is the cumulative profile reading, normally measured in the outer wheel path, reported in mm per 100 m section using a California type profilograph and a 5 mm blanking band.

2.0 **Equipment:** The smoothness profile, that is the Profile Index (PRI), will be determined using a California type profilograph. The profile is recorded full scale, vertically. The profilograph will be moved longitudinally along the pavement at a speed no greater than 5 km per hour to minimize bounce. The results of the profilograph test will be evaluated as outlined in the California Test 526 (as modified by NSTPW to metric units or as noted otherwise herein).

3.0 **Price Adjustment Schedule:** Price adjustments will be applied based on the square metres of the final pavement surface as outlined in Table 2 of this specification. The price adjustment may be omitted or modified from the requirements stated herein for various portions of the roadway as stated in the Special Provisions or as otherwise directed by the Engineer.

4.0 **Testing:** The profile will terminate 10 m from the end of each bridge deck, or from a joint between existing pavement and the new pavement. Pavement profiles will be taken at approximately the outer wheel path for every lane of traffic or as directed by the Engineer. Tapers will be excluded from testing unless otherwise directed by the Engineer.

4.0.1 Testing and Evaluation:

Profilograph testing will be scheduled to be completed within one day after completion of the surface lift of pavement (ie., within one (1) day of the completion of paving on the contract), whenever practicable. Generally, the outer wheel path for each lane (or as directed by the Engineer) will be tested in 100 m sections on the surface course using the Profilograph.

4.0.2 Retesting

Method Specification: The Contractor may request (once only) the retesting of 100 m section(s) and the Department will arrange for the retesting. If the retesting determines the PRI or "deviations" are equal to or greater than the original the Contractor will pay all costs associated with retesting. If the retesting determines the PRI or "deviations" are less than the original the Department will pay all costs associated with retesting.

End Product Specification: The Department may request (once only) the retesting of 100 m section(s) and the Contractor will arrange for the retesting. If the retesting determines the PRI or "deviations" are greater than the original the Contractor will pay all costs associated with retesting. If the retesting determines the PRI or "deviations" are equal to or less than the original the Department will pay all costs associated with retesting.

All profilograph graphical printouts (tapes) will be printed in duplicate and signed off (initialized) by the Project Engineer at the time of testing. One printout shall be provided to the Project Engineer at the time of testing.

5.0 **Corrective Action:**

5.0.1 "Deviations" Greater Than 8 mm in 7.6 m.

Within each 100 m section, all individual "deviations" greater than 8 mm in 7.6 m as measured by the Profilograph in the final surface lift of asphalt concrete may be corrected to reduce the "deviation" or the Contractor may elect to accept a penalty as per Table 1. The "deviations" are automatically labelled by the Profilograph.

5.0.2 Testing Corrections to "Deviations" Greater Than 8 mm in 7.6 m.

On those sections where corrections are made, the pavement will be tested to determine the "deviations". Any "deviations" greater than 8 mm in 7.6 m may be corrected to reduce the "deviation" or the Contractor may elect to accept a penalty as per Table 1.

TABLE 1
"DEVIATIONS" GREATER THAN 8 mm in 7.6 m.

"DEVIATION", mm	PRICE ADJUSTMENT
8 - 9	- $500
9.1 - 10	- $700
10.1 - 11	- $900
11.1 - 12	- $1100
12.1 - 13	- $1300
13.1 - 14	- $1550
14.1 - 15	- $1850
15.1 - 16	- $2200
16.1 - 17	- $2600
17.1 - 18	- $3050
EACH ADDITIONAL 1 mm INCREMENT ABOVE 18	NO. OF INCREMENTS x -$1000 + (-$3050)

5.0.3 Initial PRI Greater Than 12 mm per 100 m

Any 100 m section having an initial PRI greater than 12 mm per 100 m may be corrected to reduce the PRI or the Contractor may elect to accept an adjusted price as outlined in the Price Adjustment Schedule in Table 2

5.0.4 Testing Corrections to PRI

On those sections where corrections are made, the pavement will be tested to determine the final PRI. Any 100 m section still having a PRI greater than 12 mm per 100 m shall be subjected to price adjustments as outlined in Table 2

5.0.5 Corrections

All corrections shall be made at the Contractor's expense.

5.0.6 Retesting of Repairs

All retesting of repairs, shall be made with the same Profilograph used to perform the original testing, and shall be performed at the Contractor's expense.

5.0.7 Portland Cement Concrete Pavement

Where corrections are required, they shall be made using an approved profiling device or by removing and replacing the pavement as approved by the Engineer. Bush hammers or other impact devices will not be permitted.

Where corrections are made, the Contractor shall re-establish the surface texture to provide a uniform texture equal in roughness to the surrounding uncorrected pavement.

5.0.8 Asphalt Concrete Pavement

Should the Contractor elect to repair any final lift of newly placed asphalt concrete pavement surface which does not meet the longitudinal smoothness requirements given above, it may be repaired by the Contractor to meet the requirements either by (a) rolling (b) cold milling and replacing, (c) overlaying or (d) removing and replacing, as approved by the Engineer, in accordance with the following:

5.0.8.1 Rolling

Corrections by rolling will only be permitted to correct deviations in transverse joints or deviations greater than 6 mm in 3 m as measured by a straightedge. Prior to rolling to correct these deviations, external heating may be used if approved by the Engineer. Raking after heating shall not be permitted.

5.0.8.2 Cold Milling and Replacing

Individual high or low areas with deviations greater than 8 mm in 7.6 m., as determined by measurements of the Profilograph in accordance with Test Method No. Calif. 526 (as modified by NSTPW) shall be reduced by cold milling the lift to its full depth and lane width.

The asphalt concrete shall be replaced to its original thickness with an approved asphalt concrete mix as per the specifications for surface course mix in the contract.

Material removed by cold milling shall become the property of the Contractor. The material shall be hauled and stockpiled in accordance with Environment Regulations. All costs associated with the hauling and stockpiling of this material and other costs incidental to the work shall be borne by the Contractor.

5.0.8.2.1 Area of Repair

When cold milling and replacing, the area of repair shall be the full width of the lane in which the repair work is being performed including the paved shoulder.

Should the Contractor opt to repair, the area of repair shall extend at least to the limits of the original repaired area.

5.0.8.3 Overlaying

The lift shall extend for the full width of the underlying pavement surface and have a finished compacted thickness sufficient to correct the roughness and produce a final surface meeting specifications. The overlay lift shall conform to the specifications of this contract for the surface course mix. The minimum spread rate shall be 100 kg/m^2.

When overlaying is carried out on asphalt concrete pavement, keys shall be constructed at both ends of the repaired area as per specification to avoid a feather joint.

A second overlay will not be allowed if the overlay does not meet the longitudinal smoothness requirement. An overlay with a PRI greater than the initial PRI shall be repaired by the Contractor in accordance with 5.0.8.2 Cold Milling and Replacing or 5.0.8.4 Removing and Replacing. The Contractor may elect to accept an adjusted price as outlined in the Price Adjustment Schedule in Table 2 if the overlay PRI is greater than 12 mm per 100 m but less than the initial PRI.

5.0.8.3.1 Area of Repair

When overlaying, the area of repair shall be the full width of the paved surface including shoulders.

Should the Contractor opt to repair, the area of repair shall extend at least to the limits of the original repaired area.

5.0.8.4 Removing and Replacing

When the repair of pavements not meeting the smoothness criteria is made by means of removing and replacing material, the lift shall be removed to its full depth and lane width.

The asphalt concrete shall be replaced to its original thickness and shall conform to the contract specifications for a surface course mix.

The material removed by this operation shall become the property of the Contractor. The material shall be hauled and stockpiled in accordance with Environment Regulations. All costs associated with the hauling and stockpiling of this material and any other costs incidental to the work shall be borne by the Contractor.

All 'removing and replacing' areas shall be neat and of uniform surface appearance and conform to the contract specifications.

5.0.8.4.1 Area of Repair

When removing and replacing, the area of repair shall be the full width of the lane in which the repair work is being performed including the paved shoulder.

Should the Contractor opt to repair, the area of repair shall extend at least to the limits of the original repaired area.

5.0.9 Time Limits for Corrective Work:

Corrections are to be done within ten (10) calendar days of completion of the paving/repaving or the penalties will be assessed as noted in Tables 1 and Table 2.

Repairs conducted after the contract completion date are subject to the requirements of the Late Completion Clause stipulated in the Contract Special Provisions.

5.0.10 Costs to be Borne by Contractor:

All costs associated with corrective actions and/or repairs shall be borne by the Contractor, including but not limited to, such items as cold milling, overlaying, removing and disposal, and replacing. The Contractor shall supply all plant, labour, equipment, materials, traffic control and incidentals required to complete the work to the satisfaction of the Engineer.

TABLE 2
Price Adjustment Schedule

PROFILE INDEX PRI (MM/100M)	PRICE ADJUSTMENT, $ PER SQUARE METRE
≤4.0	*$0.338*
4.1 - 5.5 incl.	$0.270
5.6 - 7.0	$0.203
7.1 - 8.5	$0.135
8.6 - 10.0	$0.068
10.1 - 12.0	$0.000
12.1 - 15.0	- $0.270
15.1 - 18.0	- $0.540
18.1 - 21.0	- $0.810
21.1 - 22.5	- $1.080
22.6 - 24.0	- $1.350
24.1 - 25.5	- $1.620
25.6 - 27.0	- $1.890
27.1 - 28.5	- $2.160
28.6 - 30.0	- $2.430
EACH ADDITIONAL 1.4 mm INCREMENT ABOVE 30.0	NO. OF INCREMENTS x -$1.270 +(-$2.430)